

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

THE MINES AND WORKS OF GERMANY—No. III.

SMELTING.

We visited in detail the following smelting establishments, as being typical of their classes:—The zinc furnaces and refineries at Moresnet Neutre; the lead works near Goslar; and the silver smelting works, near St. Andreasburg. Besides these we glanced at several others whose operations were of a similar nature; and one at Frederickschütte, where, in addition to the usual works, there was also a special method of desilverising lead, which was introduced into England some years ago as Park's process. And here let us say a word of the uniform courtesy that was in every place shown to us. In Belgium, Saxony, and Prussia, on our presenting a letter of introduction from one of the learned societies of England, every facility was at once given, and the utmost patience and attention were exhibited towards our sometimes tedious and numerous questions. Plans of the works were freely shown to us, and in one case the books of the firm were placed at our disposal, to show the quantities of material passed through each furnace, with its percentage of fuel consumed and metal produced, the wages paid, the proportionate expense of each operation, and its percentage result.

The smelting process is dependant in all cases on the same principle—that of the greater liquification of the metallic portions of the ore than of the matrix, especially when in presence of some other substance which can chemically combine with the impurities of the ore, and form a fusible slag.

In the case of zinc the two ores used are the carbonate and the sulphide. These after the dressing operations, described in our last article, are next calcined in a suitable roasting furnace. This furnace, or kiln, is provided with three stages, each more removed than its lower neighbour from the source of heat. The ore is placed on the highest first, and after a sojourn of eight hours is removed to the second level, and its place supplied with a new charge. In this manner it is gradually heated to a higher degree at each stage, and in 24 hours is drawn out from the lowest stage, having lost about 25 per cent. of its weight; which loss represents water and carbonic acid in the one ore, and water and sulphur in the case of blonde. This apparatus answers thoroughly the purpose of calcination, but it requires a large expenditure of manual labour; and some time ago an attempt was made to reduce the expense of the operation by the invention of an apparatus consisting of a large vessel placed over a hearth, and furnished in its interior with shelves at various heights, in such manner that the ore, when charged into the vessel at the top, might fall from one shelf to another. The results, however, have not, we understand, been satisfactory, and in those places where this apparatus is in operation it is still "on trial," and undergoing modifications. From the calcining kiln the ore is finely pulverised, under heavy rollers, and carefully sieved; then mixed with fine slack, and charged into the retorts.

Two different methods of reduction are used for zinc; the one known as the Silesian is generally practised in South Germany, whilst the other, known as the Belgian, is used in that country and in England. By the Silesian process the materials, finely ground, are placed in an earthenware retort, of about 1 metre in length and 1/2 metre high, giving the appearance of a very large muffle, having a bent tube firmly luted to an opening in its front end. These retorts are arranged back to back in a small kiln, up the middle of which passes the flue from the hearth. The metallic zinc is vaporised by the heat, and sublimes through the bent tube into cast-iron cups, placed beneath the front of each retort to receive it. In this process it is usual to mix the ground ore with fine coke instead of coal, as the tarry matters from coal are liable to block up the tube, and impede the distillation. A low temperature is used, and it requires 24 hours to distil each charge. Another process was in operation in England which is now, from the large expenditure of fuel, little used. The method was known as distillation *per descensum*, a modified form of the Silesian process, but yielding from a given ore a larger percentage of metal than by any other. The coal used amounted to 63 tons per ton of metal produced, whilst the Silesian and Belgian processes use only half that quantity. The gain from this process seems to arise from two causes. First, there is no possible loss of vapour, it being obliged to pass down the iron pipe, whose open end is inside the retort, and the other end ironing the metallic zinc into the receiving vessel; and, second, the reduction is slower and longer continued, so that the residue is more thoroughly exhausted.

In the Belgian process a number of retorts are fixed, in a nearly horizontal position, in a mass of brickwork, heated by a fire-place underneath, and provided with a large chimney and damper, like an iron puddling furnace. The mixture of finely powdered ore and coal dust is introduced into the retorts, carefully cleaned out from the last charge by scraping. The heat is then increased, and carbonic oxide is given off, burning at the mouths of the retorts with the characteristic blue flame. In an hour or so the flames become whiter, showing that the distillation of the metal has commenced. The five or six furnaces, with about 70 retorts each, sending forth blue or white and greenish flames, have a very dazzling effect. A cap of wrought-iron is now luted on the mouth of each retort, to condense the vapour of zinc, which begins to issue freely. Notwithstanding this, vast clouds of vaporised zinc rise from the furnace front, and escape from the apertures in the roof. This horn-like prolongation is not fitted on to the retort in the same straight line, but in a more horizontal position, forming, with the retort at its mouth, a very obtuse angle of about 165°. From time to time the workman removes this conical cap, knocking out the oxide of zinc into a vessel for subsequent reduction to the metallic state. Every two hours the liquid zinc is scraped out of the retorts, and it is for this purpose that they are fixed in a slightly inclined position, that the liquid metal may drain from the ores, and temporarily accumulate at the shoulder, where the cap is luted on. In 11 hours the operation terminates, and the residual matters are cleaned out, to prepare for the next charge. The works go on night and day. A furnace generally needs repairs at the end of two months continuous working. The total loss of metal in vapour and residue is nearly 25 per cent. of the metal originally present in the ore.

The fuel employed is coal; each ton of zinc produced requires

nearly 3 tons of coal when the ore is carbonate, and about 11 per cent. more when the ore is blonde. The economy of fuel is further secured by an arrangement lately adopted by this firm of combining the Silesian process in the same furnace with the Belgian. The Silesian retorts requiring a lower temperature, a few of them are fixed above the Belgian apparatus, to be worked from the same fire-place by the waste heat; and using no additional fuel, the produce of these upper retorts is the measure of the economy. These, however, are charged only once a day.

The nature of the retorts, and the extreme care manifested in their composition, and patient drying, are other salient points in the smelting of this metal. We were conducted through the rooms where the crushing and grinding of the material was carried on; then to the mixing room, where the retorts are dexterously fashioned by hand. A machine was there, consisting of a wooden case and block, to turn out the retort complete at once, but its use has been discontinued, as the hand process seems to effect the tempering better, and produces a more perfect homogeneity of structure. We next passed through the extensive drying rooms, heated by flues, in which rooms were thousands of retorts, enjoying a temperature of about 88° Fahr., and finally to the kiln, or furnace, specially designed to heat them, preparatory to their being fixed in the reducing furnaces. But being requested by the director of these works not to publish any technical observations respecting the proportionate constitution and precise methods of preparing these retorts, we forbear to enlarge on them further.

The starting of a new furnace, or of one with new retorts, is a slow and tedious operation. A furnace was in that condition the second day of our visit. The retorts were already fixed in position, and were being charged with mixture of charcoal, broken retorts, and powdered ore. This is carried on for four or five days, the charge and the heat being gradually increased, until the furnace gets into proper form. Each furnace was fitted up with about 70 retorts, and treated 60 tons of ore per 24 hours. The calamine, as it occurs at Moresnet, is of two varieties, red and white, differing in the amount of iron they contain, as follows:—

Red ore..... Oxide of zinc 46 per cent. Iron 5 per cent.

White ore..... Oxide of zinc 33 " Iron 18 "

This red variety admits of being reduced at a lower temperature than the white and more refractory kinds. Advantage is taken of this circumstance by charging the upper retorts of the arrangement with the red ores, where the heat is less intense. So that, with the object of economising the fuel, the complete arrangement is—lower retorts, nearest the source of heat, charged with white ores; upper Belgian retorts, charged with red ores; Silesian retorts on the top, requiring still less heat, charged with red ores.

The clouds of vapour issuing from these retorts, in spite of the iron cap, and escaping through the roof of the smelting-house, materially affect the vegetation of the surrounding country, blighting and withering worse than smoke. To compensate for this damage, the company pays an annual indemnity to the surrounding surface proprietors. In most cases, we understood, the indemnity has been permanently bought out by the payment of a capital sum. Politically, these works are situate on a portion of neutral territory between Holland, Rhenish Prussia, and Belgium. An arrangement little satisfactory, as we were told they pay taxes to both parties. Their leaning is evidently towards Germany, and a few days before our visit Berlin officials had been surveying the district, which, with the co-operation of the excellent surveyor of the company, Mr. Max Braun, partook, we were assured, more of the drawing-room and convivial, than of the field character. The adjustment suggested is rather novel and striking. Each of the powers recoils from the idea of selling their territory for money, and equally so from bartering so many head of population at this point for a similar number somewhere else. It has, therefore, been proposed to count the number of trees on the territory, and compensate by a portion of land having a like number. The treatment of the silver ores, galena, and copper, will occupy our next article.

THE METALLIFEROUS PRODUCTS OF SPAIN.

SIR.—All who take an interest in geological study, or in mining, are well acquainted with the justly-celebrated mercury deposits of Almaden, in Spain. No cinabar lodes as yet discovered are likely ever to equal those of Almaden, either in abundance or richness of ore. But what most of your readers probably ignore is that in the neighbourhood of these mines, and in the same geological district, numerous metalliferous formations exist, which no doubt some day will attract the attention they well deserve. I take the liberty of sending you a few notes which I was able to gather during a visit to this part of Spain, and which may prove of interest. I shall, in the first place, say a few words of the district, after which some remarks on the Santa Enfernia Mine will follow, as example.

The Sierra Morena is almost entirely formed of transition rocks, more especially of the Silurian epoch. Branches of this ridge of mountains, extending northwards, form in and case the wild and naked hills which surround Almaden on all sides. The geological formation is of metamorphic and almost vertical slate, with alternate layers of hard quartzite rock. This rock, resisting better erosive influence than the slate, remains in many places prominent in abrupt and ragged peaks, whereas its neighbour is gradually worked away. The general direction of this formation varies between N.W. and N.N.W. Lodes and cross-courses of various descriptions are to be found irregularly distributed over the district. I shall only here consider those of an E.W. bearing, which are often easily distinguished at surface, cutting the higher parts of the country in an oblique hill. This relative position naturally refers to the direction of the ridges, which, it will be remembered, coincide with the N.W. bearing of the slate. These lodes are, however, not generally found alone: they are accompanied by—or rather subordinate to—quartz formations of great width, and evidently anterior in age to any metal injection. The lode generally accompanies the footwall of the quartz formation, and must be attributed to the re-opening of the fracture. The quartz formations often appear to coincide with the bearing and underlay of the slate, and for several fathoms on either side a completely parallel position may be distinguished; but this phenomenon must be attributed simply to local disturbances, which evidently find their origin in the formation of the fractures themselves. The ore found in these lodes is *argyferous lead*, and

where a few words of investigation had been undertaken the nature of the lodes discovered is very promising. The following are, as far as I can judge, the most promising characters common to the lodes I refer to:—

The bearing is, as I have already remarked, E.W., varying between 80° E. of N. and 80° W. of N. The underlay almost always is to the north. When the disturbance is great the position of the slate in the immediate vicinity of the lode is altered, and takes a parallel position to the lode. This feature is especially noticed in ground dividing two branches or parallel lodes.

The ore-bearing portions of the fracture are generally found to be those in immediate contact with the quartzite formation. Great regularity may be expected when the foot-wall of the quartz is, at the same time, the hanging wall of the lode. This is not always the case, for the lode often shows the slate and its two walls, and is then almost always disordered.

The metallic injection sometimes penetrates the quartz, filling its crevices with crystals of great beauty. Crystalline quartz is the only gangue which in general accompanies the ore; other substances, such as blonde and mundic, are but seldom found. No sulphate of barytes exists, to my knowledge, in these lodes. The lode sometimes splits, and forms *stockworks* in the slate, in which case this rock becomes the predominating gangue. It then becomes difficult to dress the ore, especially when it is composed of argyferous carbonate of lead.

When the backs run over high ground, and are placed so as to be drained naturally to a certain depth, they are always found to be strongly oxidised. They no longer contain galena, which has long been entirely decomposed, and transformed into phosphate and carbonate of lead. The phosphates are, in general, found quite at surface and gradually give way to carbonates, which in their turn disappear in depth, and are substituted by galena. It may be of interest to note that in no case have I been able to find in the rocks which accompany the lodes phosphoric acid, so that in this district the formation of phosphates cannot be attributed to the decomposition of neighbouring rocks.

SANTA ENFERNIA.—The Santa Enfernia Mines are situated about six miles to the south of the Almaden Railway station, on the unfinished road which ultimately will communicate Cordova with Madrid. This position is far from disadvantageous, and enables the Portuguese company who own the mines to obtain coke from Belmes at a relative moderate rate, and to smelt their ores on the spot. The company also possess iron mines in the neighbourhood, which supply good oxide of iron as a flux. The means of carriage to and from the station are mule carts, capable of carrying, in fine weather, from 800 to 1000 kilos. The road being unfinished renders this much more expensive than it otherwise would be; it now costs between 22 and 33 reals the ton.

The main lode now explored at Santa Enfernia has a bearing varying between 70° and 80° W. of N., with a strong underlay to the north. The peculiar character referred to as being common to the districts are here, in most cases, very visible.

I shall not attempt to describe what would inevitably lead one to repetitions, but proceed at once to give some idea of remarkable old excavations, which can be distinguished on the whole extent of the sett—no less than 2 kilos.—and by which means the ancient mines seem to have worked out the entire back of the lode to a depth of about 50 metres. These works cannot be attributed to any historical epoch in particular, but more probably Santa Enfernia was explored successively by the Romans, who were well acquainted with the Almaden deposits, the Moors, and then again, in the middle ages by the Spaniards, until their Government, after the discovery of Mexico, obliged all miners to suspend their operations, and to concentrate their activity upon the rich deposits of the new continent. In some places the back seems to have been excavated in open cuttings from the surface; at other times vertical shafts on the hanging-wall, 3 feet square, and remarkably well cut, often placed close to each other, and evidently with a perfect knowledge of the depth at which the lode would be intersected, communicate with stopes where pillars of the poorer portions of the lode alone remain, and testify to our ancestors' power of distinction between good and indifferent. A vertical section of the sett shows to the west high ground cut through by the lode, and to the east lower ground, little above the adit level. Towards the west the extent of the old works is now well known, and in some places the present operations are carried on at some depth below them. Not so, however, in the opposite direction, where the ancient excavations are even now full of water, and keep an 8-in. pump in active service. At this lower part of the sett a vertical shaft has been sunk to the depth of 42 metres, and a cross-cut is being driven south, with the intent of exploring the lode, or parallel lodes, existing at this point. Water, which evidently filters from the old workings, flows from the cross-cut to the shaft, and is pumped to surface. Most sanguine hopes are entertained of the good results of this investigation.

Towards the west an adit level is partly driven, and the work continues as fast as the nature of the ground and ancient excavations met with will allow. At the summit of the hill an inclined shaft already attains the depth of 85 metres; it will here intersect the adit level. To the east and west of this shaft winzes have been sunk, which will nearly attain the same depth. These works have, fortunately, been the means of discovering a fine deposit of ore, calculated to contain about 1000 tons, with from 40 to 45 per cent. of lead and 30 to 40 ozs. of silver to the ton of ore. The ore, as yet found quite at surface, has been the phosphate of lead, poor in silver, but often very beautifully crystallised. This mineral is seldom found below 50 metres, and sometimes is substituted by the carbonate of lead at a few metres from the surface. The carbonate of lead found at Santa Enfernia is either pure and crystallised or argillaceous and compact. Nodules of undecomposed sulphur appear in the mass of carbonate, but never with any regularity; it is only at some depth below the adit level that galena may be looked for freed from all oxidising influence. The ore at present extracted is lifted to 50 metres above the adit, and then descends on a self-acting inclined plane to the dressing-floor, where the water drawn at the vertical shaft is turned to account.

The dressing of these ores is not always easy, especially when carbonates of lead are dealt with. Small branches, containing a high percentage of silver, but poor in lead, sometimes penetrate the cleavage of the slate, or fracture in the quartz, so that separation is

almost impossible. The consequence is that some parcels of ore have to be as little dressed as possible, and leave the floors with no more than 26 to 30 per cent. and 30 ozs. of silver to the ton. Veins of spongy quartz, often yielding over 100 ozs. of silver, also accompany the carbonates in some places. When this is the case hand picking has to be resorted to, as the only mechanical means of separation. The quantity of ore sampled monthly is from 30 to 60 tons, but this amount is now to increase.

I may as well here refer to a statement made in the *Mining Journal*, some months since, by a correspondent who had visited Santa Enfernia. He declared in his letter that the roads of this district are formed of old refuse, containing 30 per cent. of lead and a high percentage of silver. I am afraid, however, that your correspondent must have been led away by the enthusiastic assurances of some Spanish friend, for having long searched for the abandoned treasure, I am at last obliged to believe that some great mistake was made. Although samples may be here and there found with the percentage mentioned, the average is so very far from the mark that I am convinced this refuse could only be worked at a loss. Smelting is carried on by the means of Spanish cupola furnaces, conical in shape, and entirely constructed of unbaked earthenware bricks. A strong blast is obtained from a fan, placed at a little distance, and driven by an 8-horse power portable engine, and enters the furnace through three tuyères. The charge is introduced into the furnace, and allowed to descend in the usual manner. The operation, as carried out at Santa Enfernia, is similar to what is seen in many other districts of Spain.

The ore is not smelted alone, but old Roman slags are introduced into the mixtures, or parvas. The oxide of iron obtained in the neighbourhood is made use of as flux, with the addition of some limestone. Of late, phosphates of lead have become very scarce at Santa Enfernia, in consequence of which, carbonates have to be treated alone. These, as I have already said, have often to have the dressing floor in a very impure state, sometimes containing very refractory slate, with hard quartz in large proportions. When this is the case, the process becomes difficult to manage, and but a small quantity of mixture can be smelted in 24 hours. The easiest remedy to so manifest an evil, would certainly be to purchase galenas rich in lead, which would more easily dissolve the silver and mechanically help the melting of the refractory gangues. The produce of Santa Enfernia in 1871 was limited to 134 tons of lead, containing 337 kilos. of silver. This produce is small, but it must be remembered that during this year no ground was stoned, but all ore was obtained from preliminary works. The works in progress will certainly soon discover other branches of ore, for little doubt can be entertained of the value of a mine so rich in silver and so extensively worked by the ancient miners. I feel convinced that, with the prudence and activity necessary to this class of enterprise, the Santa Enfernia Company will, at no very remote period, be amply rewarded for all efforts employed and risks run. I hope these hurried notes may serve to call the attention of our mining speculators to a district of no small interest.

July 3, 1872.

THE EMMA MINING SUIT, &c.

SIR.—The celebrated Emma Mine is indeed destined to become, if it is not so already, the most famous mine ever known in the world in any age or country. This fact is not alone owing to the unparalleled richness and inexhaustibility of its mineral deposits, but also from other reasons, perhaps consequent upon this great first cause, which, we trust, will not be adopted as a precedent in the subsequent history of our other leading mines. Almost from the commencement of its existence the Emma has been the subject of dispute, and since later developments have shown its true character and value it has been in constant litigation, which, it is thought, will not be very speedily terminated. Although the decision of Chief Justice McLean in the recent suit in Chancery between the Emma Silver Mining Company (Limited) and the Cincinnati and Illinois Tunnel Company has given universal satisfaction, and is considered an honest and just decision, yet it is thought that the latter company will not philosophically abide the consequences should they be defeated in the Fall Term of the Third District Court, when the case of trespass will be tried, but will appeal their case to the highest tribunal of the country—the Supreme Court of the United States.

This suit is certainly the most remarkable and important on record in the annals of mining history, not only as it involves an immense amount of property, but for the fine legal points at issue, which are of the greatest importance to mineowners in the Territory, and to capitalists at large. In the course of his decision the judge remarked "that there were but two questions in the case—the one a question of fact, the other a question of law. The question of fact is this—Is the silver-bearing ore of which the defendants are holding possession a part of the Emma vein, lode, or deposit?" This momentous question, of course, could only be decided from the evidence adduced, and that it was an extremely difficult case to decide no person could doubt who heard or read the mass of testimony on the subject. The evidence was conflicting in the extreme, affidavits of experts and engineers on the one side, whose character and experience entitled their judgement to some consideration, were flatly contradicted by affidavits of experts and engineers on the other side, whose testimony was entitled to equal consideration. Dr. O. H. Congar, on the part of the defence, testified that he had been engaged in mining in California, Montana, Nevada, and Utah for a number of years; had been an assayer of ores; had practical experience in mines, and scientific knowledge of mineral formations; and that all the observations he made satisfied him that the deposits were separate, independent, and distinct. Professor Tuck, who is a geologist and mineral engineer by profession, of 22 years experience, testified on the same side, and said he examined with great care the workings leading from said Emma deposit to the said Illinois deposit, and that nowhere did he find a connection between said deposits, and he pronounces the same to be separate and distinct deposits of ore. James E. Matthews, former superintendent of the Emma Mine, and James M. Day, one of the defendants who has been engaged in mining for 44 years, testified on the same side, and to the same effect, that there was no connection whatever between the two deposits. Senator Wm. H. Stewart, C. L. Stevenson, civil and mining engineer, Prof. Ellsworth Daggett, and Prof. Henry Sewell, testified on the part of the Emma Mining Company. Senator Stewart said that he had been interested in mining for over 20 years, and had carefully examined mines with a view to investing and conducting mining litigation, being a lawyer by profession; that he had visited the Emma several times, had twice examined the drift on the Tunnel level, and found in the whole extent very little foreign matter, and nothing to break a continuous ore connection. Prof. Daggett, a graduate of the scientific school of Yale College, made two examinations of the mine, and says, "I fully concur in the opinion expressed by Prof. Silliman in his affidavit as to the unity of the vein or deposit throughout the entire works of the Emma Company, and I am confident in the opinion that but one mineral lode or deposit was exhibited in the Emma works, or in any part of their excavations."

The testimony of Prof. Henry Sewell, a mining engineer of large and varied experience in different parts of Europe, and both North and South America, was very interesting and conclusive on this point, as was also that of Silas Williams, superintendent, and Wm. Pascoe, foreman of the Emma Mine. These latter gentlemen testified that they knew the spot on the fourth floor where it was claimed there was barren rock forming a break in the ore chain; that on the 10th inst. they went to that spot, measured off nine spaces therein of 2 feet each, and from each of such spaces where the ground had not been disturbed took a specimen of ore, which specimens were delivered to Mr. Davis, a competent assayer. Mr. Davis carefully assayed the same, and attached his certificate of result to his affidavit. From that certificate the poorest of the samples assayed in silver \$75.40 to the ton, and the richest \$295.26 per ton. Both Williams and Pascoe testify that in running the tunnel level they took first-class ore from beneath the point claimed to be a break, and shipped it to England.

I regret that time will not permit me to review the arguments which on both sides were able and exhaustive, with one drawback,

however, that they savoured a little too much of the locality called "Billingsgate." The learned counsel indulged in a great deal of personal invective, denounced the opposite party as rogues and swindlers, and, in fact, handled each other without gloves.

In giving his decision, Judge McLean reviewed the evidence at length, touching upon all the important points of the case. He alluded to the great discrepancy between the different affidavits, not accusing any one of falsehood, but said that there must be gross mistakes somewhere, and then concluded, speaking of the rights of the Emma Mine, as follows:—"It was their right to follow the vein in its length as far as it was rightly located—in depth to the centre of the earth, in breadth, although it might enter the land adjoining. If the men who held a mine before a patent is issued were the lawful possessors, then these were their rights, and a patent regularly issued to them confirmed these rights. The boundaries of a patent, so far as the surface of the earth is concerned, must remain where the Government fixes it; but under the patent in question, and the Act of Congress under which it was issued, the patentee may follow the 'vein or lode with its dips, angles, and variations, to any depth, although it may enter the lands adjoining, which land shall be sold subject to this condition.' It will not do, as learned counsel contend, to give force only to the words 'to any depth,' the words, 'although it may enter the land adjoining,' have a weighty import. The patent held by plaintiff, and the Act of Congress under which it was issued, justly construed, conveyed to the patentee that body of silver-bearing ore now in dispute between the parties. The injunction must issue."

This decision was received with loud applause, as it met with approbation from all classes of people, disinterested as well as interested parties, for although the evidence was so conflicting, and the defence was so skilfully conducted, yet the generality of people could not gainsay the important fact that right was on the side of the Emma Company, and therefore the decision could not be otherwise than honest and just.

A day or two subsequent to the decision the injunction was granted in accordance with the prayer of the plaintiff's bill, prohibiting the Illinois Company from entering into or upon any portion of the works made by either plaintiffs or defendants, from doing any work whatever, from extracting or removing any ores from the premises, and from interfering in any way with the ingress or egress of the plaintiff, or the workmen in the employ of the same. In short, entire possession of all the works was given to the plaintiff, as prayed for in the bill.

There cannot be any terms too severe in which to denounce the course of certain dishonourable and unscrupulous parties who have been endeavouring to injure the reputation of Utah mines abroad by various tricks and devices, the most infamous of which is the transmission of telegrams from this city, which have not a particle of foundation in truth. Take, as an illustration, the telegrams published in the *Mining Journal* of June 22, from Almy and Dalton in this city to Lyon in London. It is not difficult to conjecture the reason why these telegrams are sent, but we sincerely hope that these efforts to retard the prosperity of our Territory may be as futile as all her honourable citizens desire, and that English capitalists will receive them in the manner merited by their falsity—with silent contempt. It is deeply regretted by all honourable men, and especially by those engaged in legitimate mining in the Territory, and who are jealous of her good name, that some of our districts are infested with a class of sharpers and swindlers who are familiarly termed "jumpers." These men are either too lazy to work, or too poor to operate legitimately in mining property, and some of them have been gamblers, or worse, in the large cities of the East and West. They make it a special business to practise the art of blackmailing, in which they are not novices, upon the owners of good property—sometimes by pretending to have a previous claim upon the location, and sometimes by attempting to depreciate the character of the mine, and thus prevent the sale of it. But the people are determined that such a state of affairs shall not be permitted to exist, and that no one class of criminals shall be exempt from the just penalty of the laws of the United States, which afford protection to the life and property of citizen and stranger alike. A party of men who held forcible possession of the Silver Glance Mine, Camp Floyd district, were lately brought before Judge McLean, charged with resisting the process of law issued for their arrest. The judge held them to bail in the sum of \$5000 each, and plainly gave them to understand that there was a penalty attached to resisting the officers of the law. The people generally are so interested in the future welfare of the country, and the development of her vast resources, that men who have no better employment than endeavouring to retard her progress will soon discover that the wisest course for them to pursue will be to quietly retire, and find another field for their infamous operations.

Salt Lake City, Utah, July 19.

B. A. M. FROISETH.

THE METALS AND THEIR ORES—SILVER—No. XIX.

SIR.—There is no metal more deserving of attention and study, neither is there any that is more intimately associated with historical romance, than beautiful, glittering, glistening silver. Absolutely pure silver is a rarity, the silver employed in the arts being usually alloyed with some base metal, often copper, for the purpose of hardening it. Pure silver is perfectly white in colour, no other metal surpassing it in this respect; it is capable of receiving a brilliant polish, and it yields only to gold in malleability and ductility, silver leaves having been hammered so thin that 12,000 of them would be required to build a column 1 in. high, and it is so ductile that a grain in weight of the metal can be drawn into a wire 400 ft. long. In hardness it ranks between copper and gold. In tenacity it is superior to gold, but inferior to copper; a wire the tenth of an inch in diameter will support a weight of 250 lbs. It is the most perfect conductor of heat and electricity known—it has a specific gravity of 10.5—that is, it is 10½ times the weight of an equal bulk of water; and silver assumes, under special circumstances, the cubical or octahedral form of crystallisation; it possesses no taste or smell, but gives an agreeable sonorous ring when struck. Silver is not readily melted (excepting in the pocket), a heat of 1873° Fahr. being required to fuse it. At this temperature it is but slightly volatile, at higher temperatures it sensibly evaporates, and where intensely heated by the electric current its vapour burns with a vivid green coloured flame. The metal does not oxidise by heat, but when fused in the presence of air it absorbs about 20 times its volume of oxygen gas, which it liberates upon cooling, particles of silver being at the same time ejected from its surface in the form of metallic sprouts or shoots if cooled quickly. Silver is not affected by air or moisture, but it possesses a strong attraction for sulphur, hence if traces only of sulphuretted hydrogen gas are present its surface speedily becomes tarnished with a black coating of the sulphide, which is best removed by a solution of cyanide of potassium and a little whiting. Although there were five or six other metals known by the ancients, silver seems to have been employed as a medium of exchange amongst the patriarchs from an earlier period even than gold, and it has continued its occupation from the time of Abraham to the present day, the only difference being that we convert our silver currency into coin, whereas in the patriarchal age the metal was generally used in the form of bullion, for we read that Abraham weighed to Ephron 400 shekels of silver—current money with the merchants—for a burying-place sold by the sons of Heth. Joseph was sold for 20 pieces of silver. Job speaks positively as to the existence of veins of silver, and Scripture reference is frequently made to the purification of silver by lead, showing that not only was the art of metallic mining understood by the patriarchs, but that the method of refining silver by cupellation with lead, much as it is practiced at the present day, was known to them almost from the earliest periods of the world's history. Coming to more recent times [B.C. 470 years], we find from Herodotus that Pytheus, a ruler over a small territory in Phrygia, owned some rich silver and gold mines, from which he derived metallic treasures valued at 3,600,000. of our money. Plutarch relates that a private individual, named Crassus, had several silver mines, and in his opinion "no man could be accounted rich who was not able to maintain an army out of his own resources." On one occasion Crassus invited his friends to dinner, and it is recorded that the guests were so numerous that 10,000 tables

had to be provided to seat them. Might he not with reason have exclaimed, "Save me from my friends?" In a future paper I shall resume this interesting subject.

EDWARD GLEDHILL,

Mining Offices, Shrewsbury, August 13.

THE PREMIUM OF TWENTY POUNDS FOR ESSAYS ON MINING MACHINERY.

SIR.—During the past few weeks several notices have appeared in the *Mining Journal* of a premium offered by some correspondent for the best Essay on Mining Machinery. May I draw attention to the difference between this offer and that made at the close of last year by Mr. Hermon, M.P.? Mr. Hermon offered prizes of 150, and 50/- for essays on a subject which was intended to benefit the whole of the mining community. Your correspondent offers a paltry 20/- for such information as to the cost and applicability of various tools and machinery suitable for mining, in order to enable him to lay down his own plant in the most economical manner.

I contend that if the mineowner offering the premium seeks thus to save the expense of professional advice, which in the usual course would cost him at least four times the amount of his premium, if of the best character, he should make the premium more worth competing for—say, 50/- He can scarcely expect anyone but students, who have had but little practical experience, to compete for the amount offered; whereas for a good premium he would doubtless get very valuable information. It is not mentioned whether the Essay has to refer to coal or metalliferous mining, nor whether the items of boring, pumping-engines, winding-engines, &c., have to be embraced.

C. E.

THREATENED COAL FAMINE.

SIR.—"A foreseen dearth never comes." The reason of this is obvious, for when a famine is foreseen it is provided against, and no famine comes. At present we have an unprecedented high price of coal in summer, indicating a proportionately higher price in winter, which may amount to famine price. The cause of the present high price of coal is, doubtless, the revival of trade all over the world and the extension of railways, involving a large consumption of coal for the manufacture of iron. The falling off of orders, arising from the high price of rails and machinery, which must come sooner or later, is the only hope for a reduction in the price of coal, but that may require two or three years. It is idle to suppose that immediate relief can be had from an increased production of coal. It requires one or two years to sink a shaft, another year to open up the underground workings, so that at least three years must elapse before new coal fields can come into operation; and even after that we must remember that colliers cannot be manufactured in a day—the output of coal must ever be limited by the number of colliers and the amount of work they choose to perform. The only check to the monopoly exercised by the colliers is the COAL-CUTTING MACHINE, which substitutes machine work for manual labour. I trust, therefore, that this machine will be put into operation in all our great producing districts without delay. The reaping-machine and the sewing-machine are great inventions, but it may be that the coal-cutting machine may in its benefits to humanity excel them all. While skilled labourers are required for cutting coal without the machine, they are not required for machine work.

The other remedies for the impending coal famine, are—1st. A supply of wood fuel from the Baltic; and 2nd. Economy in the use of fuel. If our timber importers would order a large supply of timber from the Baltic before the navigation shuts, they would not only make a large profit for themselves, but confer a great boon on the public; for if no such supply is provided this winter there will be great distress, as heat is as necessary to the preservation of life as food. The present price of best coal in London is 36s. a ton, and in winter it will be at least 50s. a ton. How the poor of London are to subsist under such circumstances is a mystery to me, unless a great famine fund is provided, as was the case in the Irish potatoe famine, and the Manchester cotton famine.

The remaining remedy is the economy of fuel. By putting a plate of sheet-iron over the openings in the bottoms of our grates the consumption of fuel is reduced one-third, as I have proved in my own household. No ventilation is required from below, as sufficient draught is admitted from the ribs in front of the grate. If this plan were generally adopted in London the saving would be upwards of one million of tons of coal per annum.

ALEXANDER ALISON.

40, Elgin-road, Notting Hill, Aug. 12.

P.S.—I may add that the idea of prohibiting the exportation of coal is impracticable, and the remedy would be worse than the disease.

WHAT TO SELECT—WHAT TO AVOID—No. XXIV.

SIR.—After a pause of a few weeks, occupied for the greater part in visiting most of our important home mining centres, personally collecting much valuable information, the writer, in resuming this series of letters, at a period when markets are sluggish and depressed, feels it incumbent upon him, in the first place, to strenuously advise those of your readers who invest capital in mines to adopt the recommendations given in these letters last autumn—namely, "No more favourable opportunity than the present could possibly be selected for the investment of capital in sound dividend and progressive home mines." The value and correctness of such advice has been so fully and generally verified by subsequent events that it is needless further to refer to it as far as the past is concerned; but now that a somewhat sharp reaction has set in, and values have declined, another period has come about, which may be truly designated the investor's opportunity, which should not be allowed to pass without profiting by the occasion.

While in Cornwall the writer visited nearly the whole of the mines possessing a market existence, and after a most minute enquiry, and conversing with the agents, working miners, and those best able to judge as to the financial *status* of the respective companies, the only just conclusion to which anyone of experience can come to is that while there are very many mines selling in the market at quotations greatly in excess of, at any rate, their present value, there are probably more whose shares command a mere nominal price, scarcely in some cases more than the bare value of the machinery at surface; albeit, the mines themselves are sound, bona fide undertakings, situated in good districts, and containing all the elements essential to success.

In Wales and Shropshire also the same anomaly is apparent. One mine, whose returns are more than meeting the development cost, with increasing reserves and ample working capital, is selling in the market at considerably less—in some cases one-half less—than another property situated in the same locality, returning less ore, without reserves, and less favourable prospects. The uninitiated cannot possibly judge of the relative merits of such mines, the general opinion being the value of a mine is indicated by its market price, than which nothing is more misguiding.

It would not be difficult to point out mines both in Cornwall and Wales whose entire existence depends, as it were, upon the golden rays shadowed around by some rich neighbour—properties whose location being within the halo shed by some profitable mine is, apart from any consideration whatever, regarded as proof of their value, and sufficient to warrant the purchase of the shares at prices far beyond those in dividend-paying mines situated in less fashionable districts. It is not for the writer—at least publicly—to point out the position and prospects of such mines, nor to compare their respective market values, but one with any amount of experience in such matters while visiting a series of mines in any district forms certain conclusions based upon unmistakeable data.

One word as to the metal market, which just now is comparatively depressed. Last autumn the writer gave his reasons why all descriptions of metal were likely to advance considerably in price. That advance occurred, and an extraordinary activity prevailed. A panic—or, more properly speaking, a healthy reaction—has ensued, caused not so much by an unhealthy condition of the market as by comparative inactivity inseparable from the present dull season of the year. That this sluggish condition will be quickly followed by a renewed activity and improved prices is as certain as that the trades of all countries are in an unprecedented

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state of prosperity; increasing prosperity at all times implies an augmented demand for metals and advancing quotations.

EBERHARDT.—It is time that the *bona fide* shareholders in this undertaking bestirred themselves. Satisfactory information has been received from the mine, which the Chairman has thought fit to regard as secret—that is, it has not yet been deemed prudent to make it known among the shareholders, although the shares have advanced in price. Those who attended the last meeting will recollect that the present Chairman made it one of the conditions of his retention of office that all he had predicated about the manager should be verified by results. "If," said he, "I am wrong, and Mr. Ridsdale is right, I will willingly give up my position as chairman in favour of Mr. Ridsdale." Months have elapsed, and shareholders know too well the result; therefore, the Chairman is in honour bound to fulfil his promise, and allow those who have a large stake in the company to have it managed in a way which they confidently believe cannot fail to realise very remunerative returns. The writer has received private information that the mines were never in a more satisfactory condition than at the present time, and that with economic management large profits should be realised.

DON PEDRO.—The present unsatisfactory and unprofitable condition of this mine was foreshadowed by the writer some months since. The one hope is the development of the mine in depth, which can only be done when the heavy pumping machinery shall have been erected. It is very clear that the reserves left by Capt. Thomas Treloar are still being rapidly exhausted, and what possible object the directors had in recommending the last dividend in the present gloomy condition of the property must be left to conjecture. The writer fears that calls are looming in the future.

CAMP FLOYD.—This mine is now yielding large profits, and may fairly be favourably contrasted both in point of value and prospects with other mines in the district which have been capitalised at 500,000/ and 1,000,000/, the capital of Camp Floyd being 120,000/. The present profit of 4000/ per month is equal to a dividend at the rate of between 30 and 40 per cent. per annum, while it requires a profit of 16,000/ per month in Emma Mine to pay dividends at the rate of 18 per cent. per annum. *Verbum sap.*

Pinner's Hall, Old Broad-street. FREDK. WM. MANSELL.

OUR COMMERCE AND MANUFACTURE.

SIR.—Our trade with India is something memorable in the annals of colonial commerce. Before the American war the imports and exports combined amounted to 52,000,000/; last year they amounted to 102,000,000/. This is an advantage to the Mother Country from three causes—war amongst our Transatlantic cousins, Indian railways, and the Suez Canal, and the growth of cotton in the East. The revenue for 1872-3 is estimated at 48,750,000/, and the expenditure 250,000/ less. The cash balance on hand March last was 24,855,000/, of which 2,221,000/ was in England. The army consists of 195,223, of whom 63,036 are Europeans. This force is deemed ample to keep 200,000,000 of people in order. Since the year 1861 the revenue raised in India amount to 569,000,000/, the expenditure being 7,500,000/ in excess. Against this excess of outlay by the people of India they have received substantial and more than commensurate advantages—37,750,000/, for the following purposes alone: public roads, 7,500,000/; canals, 8,000,000/; harbours, 1,500,000/; civil buildings, 6,500,000/; military buildings, 11,500,000/; and State railways, 2,750,000/.

There is no doubt that material progress is rapidly advancing in India as well as at home. The increasing volume of trade, the expansion of commerce, and the accumulation of wealth proceed not by steps but strides. Again, the passing events in the metal manufacturing districts engross lively interest, and attract more than ordinary attention: conflicts between workmen and their masters, and the increased value of coal, particularly affect this description of industry. The advances in manufactured articles range from 50 to 75, 100 and above per cent., and we are told that these advances are likely to prove permanent. Hence the excitement is great, and the gains large and manifest throughout the mining and iron manufacturing districts.

In the manufacturing districts of cotton matters have been the very reverse of the iron kingdom. In Lancashire there are no buoyant markets or elastic prices, no jubilant strikes, or gracious concessions of 10 per cent. advance in wages! Discussions turn upon the possibility of keeping the mills open, and of shortening the hours of labour. The tables of exports are unduly swollen by fabrics being sent to eastern markets rather than depress prices at home. In Lancashire the stability of mercantile firms and manufacturers is being discussed with ominous forebodings of trouble. Again, in Mincing-lane brokers are not comfortable—far less happy. The following movements press difficulties, trouble, disappointment, and disaster—jute has fallen off 25 per cent.; cotton, 22½ per cent.; sugar, 10 to 12½ per cent.; and Indigo, 25 per cent. It is, therefore, evident that commerce is not all "sweets," for the merchants in several necessary products are sadly perplexed in their dealings, while realisation is most unfortunate to their interests. As a rule, the prosperity which abounds is especially identified with the working and trading classes; manufacturers, otherwise than of machinery and iron, are, as a body, not over active, or profitably employed, and great complaints are rife from builders, butchers, and holders of cotton and woolen goods.

In respect to British mining the dividends are large, and the year promises unusual gains. It is true that labour in Cornwall is scarce, and the wages high, still the prices of tin, copper, and other products range higher in comparison—the volume of yield is found, to be still expansive, hence the gains are likely yet to augment, and the opportunities for profitable investments are numerous and sound, both in character and permanence. The introduction of economical and improved machinery in drainage, discharge, stamping, and crushing machinery, tends greatly to counteract the high prices of coal, and considerable attention has of late been directed to iron mining, while several young and progressive tin concerns exhibit strong promise of early success and increasing yield. R. TREDINNICK, Consulting Mining Engineer.

SCIENCE OF INVESTMENT.

SIR.—Some two months ago I called attention through your valuable Journal to the inflated state of the Cornish share market, and especially so in regard to several popular tin mines, and I intimated my belief that absentee shareholders would not relieve the resident proprietors of shares which they had so recklessly purchased, excepting at greatly reduced prices. I, of course, alluded to Dolcoath, Cook's Kitchen, Tincroft, South Crofty, West Frances, West Bassett, and West Chiverton. All of these companies became suddenly popular, and, contrary to all past prestige, "One and all," the Cornish motto (*i.e.*, Cornishmen), became fascinated with their own mines, and, with the usual greed of spendthrift gamblers, bought out the London and provincial holders of shares in a rising market, instead of as hitherto supplying a growing demand at advancing prices, and thus relieving themselves of superfluous shares, purchased up at absurdly low quotations that prevailed for three years after the panic of 1866 and 1867. The consequences are that Cornish adventurers who purchased shares at pawnbrokers' prices (two to one against the vendor), find themselves now in possession of stock that produces fourteen to one against realisation, excepting at ruinous sacrifices. South Crofty rose from 20s. to 110/- per share, the price is 80/- per 97th share, a fall of 30,000/; Dolcoath from 95/- has fallen to 80/- a share, a decline of 64,000/; Tincroft has fallen 60,000/; Cook's Kitchen, 25,000/; West Frances, 25,000/; West Bassett, 60,000/; while West Chiverton, a lead mine is nominal at 30,000/. The first six mines have declined in market value in two months 264,000/ equal in amount to the gross value of Botallack, Owles, Providence, Trumpet Consols, Margaret, South Frances, North Roskear, Seton, Lucy, Emily Henrietta, Spearn Moor, and Wheal Bassett, with St. Ives Consols, and many others. It is agreeable at all times to congratulate Cornishmen upon their successes, and we certainly do so in this instance, upon the astounding gains accruing to shareholders in Tincroft, Carn Brea, Dolcoath, Phoenix, Botallack, Owles, Kitty, and Trumpet Consols, yet we can have no sympathy with the reckless adventurers who extended their grasp to possess "One and All" of

the "succulent plums" that render the occidental cornucopia of Cape Cornwall, so renowned and favoured in its mineral possessions. These aspiring gentlemen failed to remember that a doubtful harvest, a revulsion in popular confidence, or a suspension of dealings on the part of the London Exchange, either singly or in combination, would defeat this apparently well-founded hope of gains. Analogous inferences may be drawn, but suffice it for the present occasion to mention that it appears to us an anomaly that the sound and prospectively valuable mines in Cornwall are those least recognised by the general public, hence the large profits acquired by the initiated, who direct their attention to valuable yet neglected properties, and eschew those concerns that are so broadly advocated, and foisted upon the public at feverish and fabulous prices. R. TREDINNICK.

3, Crown-court, Threadneedle-street, Aug 13.

N. ENNOR ON STAMPING TIN.

SIR.—In my last I showed the portions of the old stamps which I intend to omit, and what I intend to use in my own. If parties will use two heads, one before the other, the front head should fall on iron, and be a little above the second row of heads, which should be so placed as to break the openings in the foremost row. The flash from them should fall on the rough half saddle grates; from them it should go to the round griddle, outside. What passes through this griddle goes into the drag; this I should connect to a jigger machine. All the heads running off as it does in the drag into a second griddle, that makes two sizes of it, and each of the sizes goes direct to two round bubbles, and the slime to a catch pit; but I believe it will be very poor—that is, if the tin is liberated, as I purpose—as all the best tin will be found in the hutch, and the rough hatched grains in the sieve. In this case I am inclined to think it will not be required to reduce it so low as it is now done, as a deal more will be got through the stamps. Nothing must be allowed to fall back under the heads that will pass my rough saddle grates, which is intended only to return to the stamps the rough portions which fall on it. I used a flash these roughs would go out, and accumulate in the drains.

The next question is, what do I gain by my levers? The "Kilkenny cat" says I shall gain nothing, and goes so far as to instance Blake's crusher, to show that every thing must be lifted from the axle—but with him I differ. In the first place, the diameter of his axle is 4 feet—that is, from the centre to the centre of the lift; then, my flanges are the same (4 feet). I lift the long end of my lever about 3 feet, to raise my heads 1 foot. I can raise them 15 inches if required, and I can drive it 100 lifts per minute. On my lever 1 lb. lifts 4 lbs. Then, I require only one-fourth of the power to lift it. I admit I use space, but I gain in time, as my heads have no obstruction in falling by braces or otherwise, my tappets and lever pass each other at an obtuse angle, and I prove my friction is so trifling that it is barely worth taking into account here. Then, I will suppose I have an equal-beam scales, which is the least friction known. To move heavy weights is to hang it on a centre pivot; then I put 5 lbs. in each scale, and it is a balance. I put 1 oz. in one, then down it goes; if I put 2 ozs. the ends move quicker through an equal space, each end, the one up and the other down, with apparently no friction—in fact, it is the least friction known. Then, I will take it on the steelyard principle. I move the centre fulcrum as three to one, when 1 lb. balances 4 lbs. Then, I add the ounce on the long end of it—and it amounts, I may say, to the same thing, but not quite (everyone should know that all falling bodies tend to form a circle), and the long end of the steelyard falls through three times the space that the short one raises, in the same given time, and with less friction. This might be said to be equalised again in raising the long end. Then, the point of contention is, what power shall I require on the end of my lever to work (say 16 cwt.) of heads 60 lifts each per minute, as on the old stamps go? But I can work 80, or even 100, or more, if required—the front heads 1 foot fall, the second row 8 inches.

Then, the grand point is, my axle flanges are a distinct thing from the old stamps axle; it is a second lever, acting *vice versa* to my levers on their long ends, where 1 lb. balances 4 lbs.; and if I work only a 2-foot crank I add one power more to my lever, let the working power be what it may. This I can show from practical working; that 1 lb. of power will lift 4 lbs.; and if I add 1 foot to my crank, then 1 lb. will lift 6 lbs. Then, I go a deal faster, and dispense with a great deal of the working portions of the old stamps, were I to put the old 5-ft. crank on my axle. You may just see what I should do. The present stamps gain nothing, it is all dead weight; but I, by way of trial, prefer using either a 2 or 3-ft. crank, and go two steps to the present stamp's one, and use three or four tappets, if required. I advocate life in stamping, if I add speed to my stamps. Look at the value of such a point gained; this, aided by a free discharging grate, must tell at once to all.

The Ancient Briton attempted to show that all power should be derived from the tappets on the axle; then he should put his horse arms on a horse-whim about 2 or 3 feet in length, or a wind rope round the axle, and put his horses to pull on either, and he would discover that he would never get up the ordinary kibble. Then what do they do to get over this? They add a long lever to the whim, so as to enable the two horses to run the round lightly, when they would get up 100 kibbles in a few hours. This is precisely on my principle; but I have a second advantage on this, as in the whim, the horse-power acts on the end of the lever, and their pulling power is within a right angle; but in my case the crank power is a second lever acting on the first. This is the law with all mechanical powers to lift heavy weights, the moving powers must be speed. What is the present beam and sweep rod, with a 5-ft. crank, but a lever acted on by a 9 or a 10 ft. piston; and it is a well-known fact that large weights should only be lifted by leverage. Then, the whole sole question is, what is the best and cheapest mode to use it? All hands but the Ancient Britons admit the old stamps are a clumsy drudge of a machine, and the cost and loss of time are enormous and frightful to contemplate, and withal they do not meet the wants of the present day. I had given up all active business, but this has drawn me out, and I will endeavour to improve the Cornish stamps; if I fail, it will surely stimulate others to improve upon it. At any rate, I have gained the grand point—speed, and I am not a loss to know how to drive my levers off the piston-rod if required.

I am only surprised that those who have invested all their spare capital in tin stamps, notwithstanding the high price it sells at, after putting up one of these old expensive stamps, do not cry out, "Good Lord keep us from being led away by these ignorant Old Britons, who believe that St. Agnes and St. Just used all their divine influence in planning and getting up a perfect tin stamp—a stamp never to be improved." Tradition says that St. Perran was the favourite of the time, but I cannot see this clearly, as St. Perran was never a monk of a tin parish. A deal of tin was carried from St. Agnes to stamp, as I mind all the valleys being full of stamps. Then St. Perran might have been the engineer, and planned these stamps, then where there would have been three of the learned divines combined in getting them up. We are told they were all sainted by the ancient tinners, who laid it down as a law that their descendants should worship and adore them as long as a remnant of their kindred remained in the West. In that case we must take them as we find them, if they are overwhelmed with ignorance.

N. ENNOR

St. Teath, Camelford, Aug. 12.

THE WHITEHAVEN IRON MINES—No. II.

SIR.—In my first letter respecting the mines belonging to this company, I gave some particulars of that portion of their property called "Eskdale Mine." I purpose in this letter to furnish a few facts in connection with the other portion of their property, which is situated about eight miles eastward of Whitehaven, and called "Floutern Tarn Mine," a name derived from that of a small lake near the north-western corner of the sett. *Tarn*, in the North of England, means a small (mountain) lake, and tarns abound in that part of England. It is said by some one that Nature's great author provided these tarns to prevent a too great or sudden rush of water down the sides of the mountains in times of heavy rains; they are of all sizes. Floutern Tarn contains about three acres. This sett is 3 1/6 miles in length, and an average width of nearly a mile; it extends from Buttermere Lake to Crummock Water, thence to Scale Force (a cascade of about 120 ft. high, much frequented by tourists), thence by a straight line through Floutern Tarn, thence along the summit of the mountain range to Red Pike—a mountain 2200 ft. high (above the sea level)—and by Sourmil Gill to Buttermere Lake aforesaid; the area is about 2000 acres, the same as Eskdale. The land is partially waste and rocky, but the greater part affords fair pasture for sheep, which are numerous scattered over the mountains. The rock is chiefly granite, of which fragments abound on the mountain slopes.

The lodes or veins already discovered, and slightly worked, are five in number. The first, or most westerly, is that called "Floutern Tarn," and a very remarkable lode it is, being of a width of about 60 ft. The abrading force of the water in Red Gill Beck exposed the iron ore to view—in fact, discovered it. The quality of the ore in this and the other lodes much resembles that found in Eskdale Mine; produce about 85 per cent. The length of the lode within the limits is 470 fms. The back over the deepest level that can be put into the mountain side—*i.e.*, inside the northern boundary line—is about 500 feet. Wherever the lode has been tested it presents the same character. The company's resources from this lode only are immense; enough for one mine if there were no other lode.

The second lode is called a "caunter" or "contra," running north west and south-east, all the other lodes being nearly north and south lodes. On the caunter a few yards of drift has been made; it is a well-defined but narrow lode, yielding good "piddle ore." Sides vertical; backs about 800 ft.

The third lode, called the "Red Pike Lode," is about 12 ft. wide, and underlies eastward. There are two drifts on this lode; the uppermost one is 43 fms. in length, and the lower one (18 fms. below) is 25 fms. in length. The quality of the ore is good, and from the width of the lode the supply will be abundant for very many years. Length nearly 3/4 mile; backs about 600 ft.

The fourth lode is called the "Middle Lode," and is 4 or 5 ft. in width. There is a drift on it 13 fathoms in length; ore in quality like that from the other lodes. Length 3/4 mile; backs about 900 ft.

The fifth lode is called the "Waterfall Lode," from its proximity to "Scale Force." Length within the sett about a mile; width from 10 to 14 ft.; backs about 900 ft. A level, 18 fms. long, has been driven on this lode, proving it to be valuable. The lodes above named are within the space of two miles; there is another mile within the sett to be explored, and in that portion it is probable other lodes will be found.

I recognise in this assemblage of lodes a property of vast importance to the company if fairly laid open, and their contents put into the market. The company at present are under two disadvantages, which require extinction preparatory to a utilisation of their resources. One is the want of dwellings for the labourers, there being no town or village conveniently near for their residence or lodgings. If the mine is to be effectively worked, as it deserves, houses must be provided by the company here as well as at Eskdale. The other disadvantage is the isolation of the property from roads over which the ore can be conveyed away to the railway stations.

I have been informed that a civil engineer has marked out a line for a proposed railway from the mine to Rowrah Station, about five miles distant from the Floutern Tarn. As this line would commence near the summit of the company's property it would involve the expense of a steam-engine on each of the lodes to raise the ore to it, and thus increase the cost of extraction. On those grounds, if my advice were asked, I would recommend that the plan of operations adopted at Eskdale should be adopted here—*i.e.*, the drift method, and the ore let down in the manner

used there to a narrow railway, which should be constructed in the valley below, to Cockermouth, a distance of about 10 to 12 miles. The expense of construction would be light, because the physical features of the country are so very favourable for a line, and the land being mostly waste.

When the lodes are fairly opened, and the means of cheap transit provided, it is believed that very handsome dividends will be received by the proprietors. The disadvantages must be removed before any effectual working can take place. Taking this property in connection with Eskdale, the company will be able, when their appliances are perfected, to send into the market more iron ore, probably, than any company in the world.

I have been informed that the company's capital, paid up, is 95,000/., which, considering the extent of the company's property, is singularly small. The secretary is Mr. J. W. Marshall; offices, 1, East India-avenue, Leadenhall street; residence manager, Capt. John Hosking. I hope that the company will add a little more energy to their operations.—*Yours, Aug. 12.*

R. SYMONS.

WEST CUMBERLAND.

SIR.—In my recent visit to West Cumberland I took observation of some of the habits and customs of the people there, which are different from those of my native county. One habit is that of common drinking to excess, and that especially on the Sabbath, when the men meet in greater numbers than on any other day of the week, when they dispute and sometimes fight. I saw three men drunk for several days in succession; one of them is a carpenter, another a smith, and the third a labourer. The innkeeper does not stop drawing the liquor so long as he can get payment for it. There is no policeman within five miles of the place where I put up, so there is no magisterial enquiry, and consequently no fine inflicted for being drunk and disorderly. The places of worship are thinly attended.

The farmers are a "well to do," money-making class; many of them have farms of their own (freehold), but they are plain, illiterate, unostentatious class of men, and mix with their servants as equals. The servants, I am told, call them by their plain names: there is no Mr., but plain Richard, John, &c. Richard Sharp has 250 acres, mostly his own (free of debt, he told me), on which he has 1600 sheep, besides lambs. His son, on another farm, has 1500 sheep. The farmers are a most industrious class, but not quite so conscientious on one point as I like to see men. The point is this—When a sheep dies a natural or accidental death, as they sometimes do on the mountains where they are pastured, the farmers do not like to sustain the loss of it, so they sell it *for sale*, unless decomposition has "supervened." I was told that in this kind of meat the name of "brack-ey" has been applied, the derivation of which I do not know. I came in contact with it in one place, at a roadside inn, where a friend and I wished to dine. We were hungry, and wanted a meat dinner. My friend said to the hostess, "What can you give us for dinner?" "I have nothing, Sir," said she, "in the house but salt mutton: I don't know whether you would like that; it has been salted twice." He said, "Let us have that," so it was fried, and submitted for our mastication. I cut off a bit, and so did he; we tasted it, looked at each other, put down our knives and forks, and said: "It was bad, and we did not like it." "It was," said he, "a meat dinner." "I have nothing, Sir," said she, "in the house but salt mutton: I don't know whether you would like that; it has been salted twice." He said, "Let us have that," so it was fried, and submitted for our mastication. I cut off a bit, and so did he; we tasted it, looked at each other, put down our knives and forks, and said: "It was bad, and we did not like it." "It was," said he, "a meat dinner."

In the rural districts the art of cookery is imperfectly known. If you ask for a beef steak it is literally *steamed*, so that the goodness, as people say, is taken out of it, and the taste is not like that of beef proper. The only meat that I had well cooked was ham, which was certainly very good, and that was almost the only thing that I could get outside the towns. If I wanted buttered toast, they would cut a thin slice of bread, toast it on one side only, and butter that. Of nice cream I could get none. The bad cookery is one reason why miners from Cornwall dislike the lodgings in the mining districts of West Cumberland. When houses are provided into which they can remove their wives and children, and cook the food in their own way, no doubt they would be willing to leave Cornwall to obtain the superior wages given in the mines of Eskdale, &c. In one respect the West Cumberland people resemble the Cornish; it is in the quality of *ingratiteness*. They want to know all about the visitors and their business. They appear almost distressed until they find who you are, what you are come about, &c.

There are some portions of West Cumberland (the mountainous parts) very difficult of habitation; you may go miles without passing one, so that travelling alone

take the reins in their own hands, and appoint new directors, they will deserve the fate which evidently awaits them.

Reference is made in Mr. Dawson's report to a house in the city. It is represented as having cost 5000^l, when in reality it did not cost 2000^l. Mr. Dawson states that the house on the mine ought to have been sufficient for any manager to live in. So it is; but why did not Mr. Dawson add that it was required for a hospital? He found it a hospital, but having dispensed with nearly all the force, without consulting the shareholders, it was no longer required as a hospital; the youth in charge, I am informed, is living there. On the mine the said youth is safer than in the city.

The report written by Messrs. Morrison and Kitto was, I believe, written in the same interest, and the letter signed Edward Hosken will turn out to be incorrect. No doubt Capt. Thomas Treloar will at the meeting give the shareholders full information upon all matters, and if a committee of enquiry be appointed they may find that during the last three years he has been dragged in the mud, made a tool of, sucked like an orange, and would be kicked aside if it were in the power of the clique to do such a thing.

A SHAREHOLDER.

ST. JOHN DEL REY MINING COMPANY.

SIR.—I have noticed the correspondence that has been going on in your columns for some time past in connection with this mine, and am by no means surprised to find that the anxiety of shareholders is daily increasing; but amid this continuous anxiety there is an inexplicable apathy—or, perhaps, the more correct term would be an apparent helplessness—on the part of shareholders. In our present dire condition should we not be consulting our own interest were we to request our board to solicit the advice of Capt. Thomas Treloar, under whose efficient management the mine was brought into that splendid condition in which Mr. Gordon found it when he was appointed manager? As long back as January, 1869, at a general meeting of shareholders the Chairman, in reply to a question put by a shareholder, stated that "as the name of Capt. Treloar had been mentioned, let me say we could hardly expect any help from him." Why was not the question pushed home—why was not the Chairman forced to say that Capt. Treloar's advice ought or ought not to be asked? Because Capt. Treloar and Mr. Gordon had not parted friendly was not a sufficient reason for Capt. Treloar to have withheld his valuable advice to the company in their great calamity. Had he been asked I am sure he would gladly have done so, both for the interests of the shareholders and the good of Brazilian mining; and as no living man knows Morro Velho Mine so well, what valuable aid we would have had, what painful anxiety we should have avoided.

Is it too late now? Cannot such advice and knowledge be taken practical advantage of even at the eleventh hour?—*Aug. 13.*

AN ANXIOUS SHAREHOLDER.

ECLIPSE GOLD MINE.

SIR.—I observe in the Supplement to last week's Journal a letter, in which the writer sadly traduces the reputation of the present respected manager, Mr. Jones—whom I have known for the last twenty years as an honest, truthful, and industrious mining engineer. It is a great pity that Capt. Tamlyn did not address his remarks to the company from Independence, instead of travelling some 7000 miles to do so—then he would have given Mr. Jones a fair chance of defending himself; but probably that would not have answered the end which Capt. Tamlyn had in view. He appears to preach a great deal on the doctrine of principle and goodwill towards men, but I must confess that I cannot see any in his letter. I trust Mr. Jones's friends will not take the remarks of Capt. Tamlyn for granted, without first hearing what Mr. Jones has to say in his own defence. FAIR-PLAY.

Aug. 12.

THE ECLIPSE MINE, AND ITS MANAGEMENT.

SIR.—If it be that three of the largest shareholders are to proceed to the mines, I would suggest that one, at least, should have some knowledge of engineering in regard to the winning of ores, crushing, washing, and the constructing of the tram-road, &c., so that he would be able to advise for our future welfare. I have seen valuable mines in British Columbia and California, which have come to grief simply on account of not having a good man at the head. Probably we may require a new captain; it is now essential to have one who is skilled in the making and creation of machinery and mechanical appliances generally, and not have to depend on a self-styled captain, who has helped to dig a big hole in Cornwall or Wales. There are sadly too many of this class on the Pacific Coast, too anxious to squander good money away in undertakings they know so little about, in order to fill their own pockets and those of their mates. Judging from recent reports the Eclipse Mine has been worked similarly to the Lander Hill Mine of the Pacific Company, which was conducted for two years by a freemasonry of happy mates, at a fearful waste of time and expense to the shareholders. I hope our new board of directors will bear in mind these few remarks of one who holds— THREE HUNDRED SHARES.

Muchester, Aug. 12.

THE GREAT WESTERN MINE, NEVADA.

SIR.—I have watched with much interest the correspondence now going on in your valuable Journal respecting the Great Western Mine, Nevada, and, as a shareholder, would suggest that an extraordinary meeting be convened to consider, among other matters, the following objects—1. To ascertain the truthfulness of the prospectus. 2. Whether the directors were justified in sending out Mr. Nelson, one of their body, without learning that he (as he afterwards confessed at a shareholders' meeting) knew nothing of mining, and also extracting him with the power of paying over to Mr. Ellery, the vendor, 20,000^l, without first ascertaining, through some mining expert, its real value? I may here state, for the benefit of all concerned, that I wrote (after I saw the brokers could not deal in the shares) to each director, asking what price he or they would give me? And the reply was from one—"We are afraid we have been deceived in the matter, and as a holder of 100 shares, would gladly accept an offer from you for the whole or any portion." This being the case, why was not the company at once wound up?

In the interest of those who read your influential Journal, I hope that a Committee of Investigation may be appointed by the extraordinary meeting, composed of men of integrity, with power to ascertain the real facts of the case, and publish them for the benefit of those who may hereafter receive "Circulars" from unknown brokers, and secretaries of such like companies. A HOLDER OF FORTY SHARES.

CWM ELAN LEAD MINING COMPANY (LIMITED).

SIR.—Can any of your readers inform me the best course to proceed in the following case? I am a large shareholder in the above mine, and was recommended to increase my interest. Before doing so, I applied personally at the office for an order for my agent to inspect the property, and demanded, as a right, an order (if such were necessary) for that purpose. This was denied me, in no very civil language, by a person calling himself the secretary. I at once wrote a letter to the board, requesting they would furnish me with an order, also informing them I was charged a fee of 5s. each for registering transfers, while I learn that others having transfers made are not charged any fee whatever, and desiring to know when the resolution was passed, and at what meeting, imposing such a demand. To this I received the following reply:

SIR.—At a recent meeting of the shareholders it was decided that the mine should be inspected by competent persons and reported on; that inspection has taken place, and the report is in course of preparation, and will shortly be issued, and we do not deem it advisable in the interests of the shareholders to grant orders for private inspection.

As regards the transfer fee, I beg to inform you that the board was perfectly cognisant of the charge of 5s. per share on paid up shares. The directors regret you must be under misapprehension as to any act of incivility.

The directors beg to inform you that you did not see the secretary on the occasion of your call at this office, but they understand that your demand was made to Mr. Gunn, in such terms as were highly offensive to that gentleman, who has always shown every readiness to afford information to all shareholders. Any further observations you may have to make will be laid before the directors, and duly attended to if put into writing.

ROWLAND WEBSTER, Chairman.

Now, as the recent meeting alluded to was held so far back as May 1 last, I think you will agree with me that in the interests of the shareholders it is quite time the report was furnished. But this refusal to allow a shareholder to inspect his property is one I have never before met with, although, Sir, as you are aware, I have for the past 20 years been connected with mining, and am a large holder in various mines throughout England and Wales. My only conclusion is that, instead of the interests of the shareholders being consulted by this act of the directors, it is sometimes the reverse. Again experience teaches me that every reliance should not at all times be placed in reports prepared and embellished by directors so much as a personal visit, or an inspection by an agent in whom you have confidence. If this mine were situated in Cornwall a single application to the Vice-Warden would at all times result in an order being granted for an inspection. This, Sir, however, is a limited company, and in Wales, therefore, I know not how to proceed.

In conclusion, I will just remark, in explanation of the paragraph in the letter above quoted—viz., "The directors beg to inform you that you did not see the secretary," &c.—my only answer is that, on my asking for the secretary a person calling himself "Mr. Gunn" presented himself to me, and, on reference to the acknowledgment I received from the office for my transfers, dated Aug. 6, 9, and 13, a subsequent certificate, dated Aug. 13, is signed "Rowland Webster, Chairman"; but I am refused this request, by a person styling himself "H. Walter Verdon, Secretary," as the office hours of the Cwm Elan Company are only from 10 A.M. to 12, excepting once a month, when the directors meet, and the time is extended from 10 to 4 P.M.

I trust that the insertion of this letter will enable me to obtain some information respecting this company.—*Cly, Aug. 14.*

CIRCULAR MINING.

SIR.—Your correspondents, Messrs. W. Hannam and Co., in spite of their "speculations" (which, by the way, they kindly and politely recommend to my use), have taken rather a perverted view of the subject of my communication. They thought proper to send to me "Circulars" neither requested nor required; a practice I dislike of, especially where, as in this instance, observations are made calculated to influence prejudicially the interests of a company to which I belong. Were all the "bona fide shareholders" in the Emma Mine to follow their advice, the result would be another senseless panic (very gratifying to the "Bears"), and, I fear, the bulk of them would then have little to "thank their stars for" or W. Hannam and Co. either.

No doubt Messrs. Hannam and Co. are very estimable gentlemen, but they are perfect strangers to me; indeed, I never had the pleasure of seeing either W. Hannam or the Co.; ergo, I cannot justly be taxed with having made an "attack" upon them. If they simply bear in mind the adage—"Those who live in glass houses should not throw stones"—and discontinue the practice of sending "Circulars" to strangers, who probably fail to appreciate their kind intentions (for this is unquestionably an ungrateful world, Sir, as many persons in the habit of sending "Circulars" have doubtless seen this discovered), they may depend upon it they will become far less liable to what they are pleased to designate "attacks." I confess to some tenacity of purpose in endeavouring to preserve my own interests and those

of the "bona fide shareholders" in the Emma Mine; and although W. Hannam and Co. pronounce my conduct "obstinate," I submit that this is a sheer fallacy, and that, in justice to me, it merits the milder appellation of decision of character.

Of course, the "bona fide shareholders" will decide for themselves whether to follow the counsel of W. Hannam and Co., and sell, or abide by that of the directors of the company, who have already "expressed the hope that they will not be tempted to sacrifice their property."

With regard to my "num de plume," it is surely unnecessary that I should publish my "veritable cognomen" to gratify the craving of every enterprising advertiser, who, either for sport or emolument, thinks proper to show down his "Circulars" upon my devoted head. I, therefore, continue to subscribe myself—

A FELLOW THAT HATH HAD LOSSES.

ADVICE TO MINING CAPITALISTS.

SIR.—Being a constant reader of your most valuable Journal, I have noticed of late reports appearing in public prospectuses of mines in Cornwall and elsewhere, written by persons, who, although not having a practical knowledge of mining, sign themselves Mining Engineers. Now, Mr. Editor, I believe that many of these reports have been written by persons who never worked underground a day in their lives; and I should wish the question to be put to such pretended engineers—What mine or mines did they ever work in to obtain their experience? The fact is, they are merely shown underground, and things there pointed out to them, most likely by the agent on the mine or some other practical person of experience, and whatever may be stated by such person is the foundation of the so-called Mining Engineer's report; and, unless that class of persons are stopped from misleading the public through calling themselves M.E., the end ultimately must be bad. Adhere to the old saying—"A stitch in time saves nine." Enquire into their practical knowledge before engaging or believing in them, and I am certain the result will be beneficial to all investors in mines.

Cornwall, Aug. 12.

A WELL-WISHER TO PRACTICAL MINING.

CARZISE MINE.

SIR.—Legitimate mining ought not to be influenced by the rashness of speculators who have no capital to "invest," but who take up shares in the hope of an early *primum*, such as was obtained for a short time in Carzise, &c. Disappointed, as many persons have been, of the expected rise, they, or some of them, have sold at a discount, or relinquished their interest, losing the calls paid. Most wrong beginnings end badly. This company ought not to have been formed on such a basis; and I hear that the affairs are going into liquidation after a few months preparation for working. I heard a few days ago that Capt. Teague, of Tincroft, sold a large engine for this mine for 2100^l, through Capt. Rogers, and that the same engine is charged to this company at 2900^l. Can this report be true? If it be true, I should not like to be a party concerned in the transaction. I should like to be assured that the agents said to be implicated in this transaction are clear in the matter. Honesty, straightforward conduct, should characterise all mining and other business. Perhaps one of your readers will kindly satisfy the enquiries of—

London, Aug. 12.

HARMONY AND MONTAGUE.

SIR.—I understand most things that occur in mining; but there is one thing connected with this mine that I do not understand. I should be glad to be informed whether the reports made by Capts. Pope, Floyd, and Stephens were truthful statements (they were, it will be remembered, sustained by Mr. George Henwood); or whether the damning report made by Capt. Rich is a doubtful one? The mine was set to work solely upon the recommendations of the four first-named gentlemen, who represented that tin ground of enormous extent could be worked on with considerable profit; and upon the faith of those recommendations preparations were being made for stamping on a large scale; when, unexpectedly, Capt. Rich came to inspect, and reported that there was not a stone of tin in the mine! whereupon operations ceased; and now the affairs of the company are in the Statuary Court. Who of the agents were right? Is there much tin or no tin? ONE PUZZLED.

Truro, Aug. 14.

POLCREBO MINE.

SIR.—I beg to inform you and the public, through the medium of your valuable Journal, that this sett, in the parish of Crowan, near Camborne, has in its composition the essential elements for making a productive and a lasting tin mine. The former workers, without rule or order, adhering to the old system of the rule of thumb, and neglecting, or being totally unacquainted with, the importance of the secondary element in the form of a cross-course, and also mixed strata of ground, after driving by the side of the lode about 10 fms., and in driving south to the cut to this level, 17 fms. below the adit, or 28 fms. from surface, it was quite evident that the lode was heaved north by the cross-course, and not south; and on searching north, and without driving a single foot of ground, we discovered a lode, of the extent or size of which we are to the present ignorant, having cut into it about 3 fms., and without finding the north wall. The lode, as far as we have seen, has been pronounced by competent judges one of the best they had ever seen, and worth from 60^l to 100^l per fathom; the discovery was made only yesterday (Tuesday). When we get through the lode I will write you more fully on the subject, as to its value, &c. *JAS. WILLIAMS.*

THE EAST WHEAL BASSET MINING COMPANY.

SIR.—A meeting of the adventurers in this mine is convened for Tuesday next, and I hear from an authentic source that another sale of 300^l worth of stoneware will be effected between this and the meeting, this with the former sales amounting to 800^l, which have been achieved since the last meeting of adventurers, held nearly three months ago; and several hundreds of pounds worth of lower quality stoneware has accumulated on the mine, awaiting the working of the new steam stampers. These are extraordinary facts; they are so, indeed, when we take into account the very limited number of men engaged in developing the resources of the mine; and then, again, it is but a short time since it was publicly known that the mine was on the verge of being abandoned. The question which most reasonably would be asked after this is, What has so recently brought this mine into such a healthy condition? Although I have been but a small shareholder for many years past, yet this little information may prove beneficial to my fellow-adventurers, now that public attention has been turned to this, which I have long thought and announced to be a neglected mine. I have sent my agent to inspect it, who is amongst many of the most reliable mining authorities of this county that have also inspected this mine; hence the reason for many facts being exposed to broad light, which have led me to suppose in an attempt to account for the great reluctance in publishing the real merits of our mine.—*Truro, Aug. 15.*

W. S.

[For remainder of Original Correspondence see to-day's Journal.]

TERRAS TIN MINING COMPANY (LIMITED)—COURT OF THE STANARIES (Before the Vice-Warden).—Mr. Marrack, under the 31st section of the Companies Act, 1862, made an application on behalf of Mr. Edward Cavendish Tahourdin, that the company be called upon to show cause why the applicant's name should not be inserted in the register of shareholders in respect of 500 shares, and that the list be rectified accordingly.

It was stated that Mr. W. S. Pearce, the company's secretary, sold to Mr. John Addison in February, 1871, 500 shares in the company, numbered 2001 to 2500, both inclusive, the consideration money being 893^l, secured by bill from the purchaser. Mr. Addison received certificates in respect of those shares, and soon afterwards negotiated with Mr. Tahourdin for sale of the shares in question to him for cash.

Concurrently with this last transaction, Mr. Tahourdin having had the shares transferred to him, agreed with Messrs. Marborough and Co., brokers in London, through Mr. Beazley, their trustee, for sale to them of 200 of the above-mentioned 500 shares; and, in order to completion of the transaction with the company, the certificates from Mr. Pearce to Mr. Addison were sent, with the transfer of the 50 shares, and also with the sub-transfer of the 200 to Mr. Beazley.

The secretary returned the transfers, stating that he had already disposed of or transferred those 500 shares, but he did not return the certificate of shares, and that certificate it had been impossible to obtain to the present day.

It was understood that Mr. Pearce (the secretary) got Mr. Addison to retransfer to him the 500 shares, but Mr. Tahourdin, of course, contended that he, being the holder of the certificate of shares and of the transfer, was the complete owner of the property, and that the secretary was bound to register that transfer, accompanied, as it was, by the certificate.

On behalf of Mr. Tahourdin it was contended that, according to facts in evidence, the register ought now to show 300 shares in Mr. Tahourdin and 200 in Mr. Beazley.—Mr. Marrack read lengthy affidavits in support of his application, and the Vice-Warden granted the required order to show cause.

W. S.

THE NEW ZEALAND KAPANGA GOLD MINES.—In addition to the information contained in last week's Journal, it may be mentioned that the necessary large works have been commenced by Mr. Thomas. The *Coromandel Midland* says:—"These operations have been the means of already causing at the adjoining ground on every side of the Kapanga lease to be taken up by influential mining gentlemen in Auckland. An extensive undertaking of this kind taken in hand by foreign capitalists, who are sending out the best plant from Cornwall, will do an immense and almost incalculable amount of good to the Coromandel field at large. The tenders for sundry works and materials required by the Kapanga Gold Mining Company indicate that this company has commenced work in earnest. It is a matter of congratulation that the merits of the gold field have been sufficiently recognised at home to induce the investment of so large an amount of English capital as we understand this company commands." It is to be hoped that the Kapanga is only the pioneer of other similar undertakings, which we believe offers much safer and more brilliant prospects of good returns than the shape of affairs of this enterprise in which English capital is largely embarked.

EUREK GRINDER AND AMALGAMATOR.—The machine invented by Henry Bothoff, and manufactured by Hendrie Brothers, is now in successful operation at Whitecomb's Mill, in Nevada. The amalgamator consists of a tub about 5 feet in length, and 2 feet in width, the sides being in the form of a segment of a circle, so that the bottom, an iron plate, 1 inch thick, forms a concave surface. The muller, another iron plate, 1 inch thick, is made convex to fit the bottom of the tub, and is suspended from uprights rising on each side of the tub, and made to swing like a pendulum, thus grinding the pulp that passes between the upper and lower plates. There are adjusting screws for raising or lowering the muller. When grinding, its whole weight, several hundred pounds, is brought to bear, so that the pulp is reduced to an impalpable powder, polished, and rendered susceptible of amalgamation. It is fixed at the extremity of the tables, so that the crushed ore passes from them to the amalgamator. The quicksilver is held on the upper surface of the muller to prevent grinding. This surface is covered with a copper plate, upon which the amalgam is gathered. Mr. Whitecomb informs us that this amalgamator saves about twice as much gold from the tailings as the Bertoia pans, with none of the labour or trouble necessary to keep them running, since the work of charging and discharging is constantly going on, and it is necessary to clean up only once each week. The machine now in operation receives the tailings from two stamp batteries, and on 6-ounce ore saves about 50^l a week. So well pleased is Mr. Whitecomb with its working that he has ordered another from the Messrs. Hendrie, which will be set to receive the tailings from the other 12 stamp batteries in the mill. With these additions it is believed that \$100 a week will be saved, with very little trouble or expense, which otherwise would go down the gulch, or only be saved by the troublesome process of handling over and running through pans. This is the first amalgamator of this pattern that has been used, and should it prove as effective on longer trial as it now promises, it is probable that the Hendrie Brothers will find a large demand for them.—*Colorado Register.*

LONDON GENERAL OMNIBUS COMPANY.—Traffic returns for the week ending August 11, 1872.

London General Omnibus Company.—Traffic returns for the week ending August 11, 1872.

Royal School of Mines, Yermyn Street.

[FROM NOTES BY

parts it entirely out of the power of those who are in the cage to do anything to save or help themselves. The best preventive, no doubt, is to employ only the best materials, and to have the ropes and apparatus frequently and carefully overhauled; and from 1546 to the present time the subject has had much of the attention of ingenious inventors, and many contrivances of more or less merit have been made public. The foundation of all these contrivances it is obvious must be the guides. One of the earliest of these was the "parachute," invented by M. Foudriner, who was then living in Staffordshire. His plan was by means of wedges introduced between the wooden guide and a part of the cage brought into play by the action of a spring on the breaking of the rope to bring the cage to a standstill.

Another plan, invented by M. Fontaine, has been applied with success at the great collieries of Anzin, in France. When the rope breaks two arms or levers are set at liberty, which, projecting on each side, brings the cage to a standstill. This was stated to have been the means of saving 150 lives; but that so many should have been placed in danger speaks badly of the materials of which the ropes are made, or of the discipline of the mine. There are several very useful inventions which, by means of eccentricities, bring the teeth when the rope breaks on to the guides. One of these is known as "Owen's" in which the grip acts from the side. There are, however, so many modifications of the principle of clutches or catches that they are all open to the remark that while their application has answered well where the drawing is at a slow velocity, they have not been found so useful or compatible with rapid drawing, in which they have a tendency to come into play when they are not wanted. It is obvious that when the cage is lowered at a rapidity equal to that of a falling body, the rope must be slackened with even greater rapidity, and the pressure being thus taken off the rope in some of its surges, the effect is the same on the apparatus as if it were broken which, coming suddenly into play, arrests the descent of the cage, which then has to encounter a not less serious danger from the descent of the rope upon the top of the cage. It is for this reason chiefly that safety-cages are not met with in the North of England, where extremely rapid winding generally prevails.

Great care is being taken as to the state and strength of the ropes, the risk is thought to be less without this apparatus than with it. Great stress, therefore, is properly laid upon having the whole of the winding gear thoroughly and frequently overhauled.

Another class of apparatus is intended to provide against overwinding, from which serious accidents frequently happen. These sad catastrophes are due chiefly through carelessness or inadvertency in the engine-house, when the cage instead of stopping on reaching the surface is brought up violently against the pulley overhead, which then breaks the rope and lets the cage fall down the pit, or turns it over, and the unfortunate occupants rarely escape a terrible death by being precipitated to the bottom of the shaft. And as with the large drums now used a single stroke of the engine raises the cage 60 or 70 feet, it is obvious how necessary it is to have a careful engineman, and the machinery under perfect control. The object to be obtained is that of casting loose the cage at the moment it reaches the top of the shaft, so that it could not by any possibility be brought up violently against the pulleys. This is done in several ways. By one of them two catches are so placed as to let the cage pass them, and then falling back to their original position supports the cage, when by the action of a particular sort of hook the weight is detached from the winding-rope. These safety hooks, as they are called, are not heavy in weight, and do not cost much. After all a good deal depends upon the engineman. A signal bell rings when the weight has passed a certain point, as a signal to lower the speed, and of late steam-breaks have been added, which are self-acting, and come into play by the admission of steam into a special cylinder as soon as the cage passes a particular point in the guides. It is, however, to be greatly regretted that more attention is not given to this matter, as scarcely a week elapses without some disastrous accident from over-winding.

IRON AND STEEL INSTITUTE OF GREAT BRITAIN.

The reading of the paper "On the Geological Position and Features of the Coal and Ironstone Strata of the West of Scotland," by Mr. JAMES GELKIE, of the Geological Survey (an abstract of which was published in the Supplement to last week's *Mining Journal*), was followed by an interesting discussion, in the course of which the PRESIDENT remarked that when they imagined the labour and study involved in the preparation of the paper that had just been read, they could not fail to be struck with its importance and value. If anything could add to its completeness it would be to have it illustrated by one or two questions, which he was sure the author of the paper would be delighted to answer.

Mr. WOODHOUSE doubted whether anyone would venture to question the exactitude and skill with which Mr. Gelkie had drawn up his paper. For his own part he did not know much about the geology of Scotland in general, but there was one part of the western coal field that he did know about, and that was the Kilmarnock district, the whole details of which he had carefully examined. He ventured to say that a more interesting description of the geology of this part of the Scotch coal field could not have been written. He had described with the utmost exactness and clearness the difference between the carboniferous formation of the Midland Counties and that of Scotland. In sitting down, he must congratulate someone on the good sense displayed in having the papers about to be read printed and passed through among the members beforehand. (Hear.) It was an example that should be followed by other learned societies. (Cheers.)

Mr. JOHN YOUNG, Hunterian Museum, University of Glasgow, stated he had listened with very great pleasure to Mr. Gelkie's paper, and could say that he described very fully and faithfully the various geological strata observed in the coal fields in the West of Scotland. He himself had been a geological worker in these coal fields for many years, and could, therefore, bear testimony to the truthful description Mr. Gelkie had placed before them of the various divisions into which the carboniferous limestone series of Scotland had been split up by intercalations of other strata, and which distinguished this group of rocks in this country so much from those of England and Ireland, and other countries where carboniferous limestone prevailed. Mr. Gelkie had shown them that in the calciferous sandstone series, or lower coal measures, of Scotland, as well as in the lower and upper carboniferous limestone series, beds of coal, oil shale, blackband, and clayband ironstone were of frequent occurrence in every coal field, which, alternating with marine limestones, indicated old land surfaces, shallow seas, estuaries, and freshwater lakes, in which these varying strata were laid down. In England and Ireland, on the other hand, the strata of the same geological age are represented by massive marine limestone, many hundred feet in thickness, implying deep sea conditions during their formation. Mr. Gelkie had also pointed out that during the deposition of the lower carboniferous rocks of Scotland outbursts of igneous or volcanic rocks were of frequent occurrence in their midst, and it is interesting to find amongst these fire-formed rocks evidence of coal beds, indicating old land surfaces, and of lake deposits, with fish remains of carboniferous age, all clearly indicating that these igneous rocks were not all poured forth at the same time, but that there were periods of repose of greater or less extent, during which the intercalated strata were deposited. He (the speaker) had lately examined a very interesting section near to their own doors where phenomena of this kind were to be observed. The beautiful trappine hills of Bowling were familiar to all those acquainted with the scenery of the Clyde. In these hills there occur beds of coal and shale, with plant and fish remains on various horizons between the sheets of trap. The coal, as might be expected, is of an impure quality, and varies from a few inches to 1 or 2 feet in thickness in some of the seams. These coal beds are only interesting in a geological point of view, and from their position among the traps can never become of commercial importance. He only, therefore, referred to their existence in this locality to show how varied were all the circumstances under which the lower coal beds of Scotland were laid down. In one of the pictures before them there was a representation of what may have been the condition of things in Scotland during the deposition of these rocks. On the shores of the lake are represented the forest vegetation that formed the coal beds, while in the lake itself the deposits were laid down, entombing the fishes of the period, and from the volcanic vents of the hills in the entombing of these coal beds, as at Bowing. Mr. Young concluded his remarks by again expressing his gratification at the very able way in which Mr. Gelkie had placed the carboniferous deposits of the West of Scotland before the meeting.

Mr. WHITLEY, of Leeds, had great diffidence in rising to criticise Mr. Gelkie's admirable paper. He might, however, go a step further than he had already gone, and instead of simply giving them the great broad facts of universal nature, seek to solve for future ages that which would ultimately have to be solved—the cause of all these varying metallic formations. He had not the least hesitation in saying that they were formed by the rays of the sun acting on the surface of the earth, and if they traced this argument down to the remotest basin they would find this philosophy justified. He granted this was a new theory, but it was one that he had advocated again and again, and whilst he was not a geologist himself, he asked the geologists of the present age to take this principle as the basis of their enquiries. If they analysed a twig they would probably find that on the sunny side there was something different to what they found on the shady side. (Laughter.) He could demonstrate this fact if he could but show them the result of his own observations. It might be a wild theory, but there never was a theory that was not set down as something approaching to madness. (Hear, hear.)

The PRESIDENT then moved a vote of thanks to Mr. Gelkie for his paper, and this having been acceded by acclamation, the proceedings of the day were brought to a close.

Later in the afternoon many members of the institute visited the Blochairn Works, where they saw Mr. Stevenson's self-acting clutch in operation. The clutch and its modes of application were fully described, every facility being afforded to the visitors to see it in ordinary operation.

The proceedings of Wednesday commenced with the reading of an interesting paper "On the Rise and Progress of the Scotch Iron Trade," by Mr. JOHN MAYER, F.C.S., of Glasgow, in which he stated that ironmaking in Scotland commenced in Carron, near Falkirk, in the year 1700; the original partners of the company being Dr. John Roebeck and his two brothers, Samuel Garbet, and several members of the well-known Cadell family, of Cockenzie, in East Lothian. Roebeck was the moving and guiding spirit in this new industry in Scotland. He ranked high as a man of science, particularly in chemistry and metallurgy, the principles of which he constantly aimed at applying in manufacturing industry. Watt's early experiments with his steam-engine, the rapid increase in the make of pig-iron, and the extent and variety of their manufacture in iron, especially the famous carboneates, the production of which was long the specialty of Carron Ironworks. Malleable iron was made at Carron some time previous to 1792, when there were five blast-furnaces and all the other necessary appliances for carrying on an extensive and varied business. At first the capital of the company did not exceed 12,000*l.*, but it was very soon increased to 150,000*l.*, and in 1773 the company was incorporated by Royal Charter. No very marked progress had characterised the history of the Carron Company for many years of the present century. In 1788 the Clyde Ironworks were established at Glasgow. The special points of interest attaching to them were the facts that David Musket, the discoverer of the blackband ironstone, began his career there, and that during the proprietorship of Mr. Colin Dunlop the original practical experiments which led to the hot-blast invention were performed there by James Beaumont Neilson—an invention which, in conjunction with Musket's discovery, was the making of the Scotch iron trade. The Devon Ironworks, near Clackmannan, also north of the Forth, were commenced in 1792 by Messrs. Roebeck and Longridge. They were specially interesting from the circumstances that the furnaces were cut in the solid rock, and had a lining of fire-brick, and that they were provided with the largest air vault ever used at an ironworks for blast purposes. It was also excavated out of the solid rock. At these works the

late Mr. Alexander Christie laboured assiduously to collect and utilise the blast-furnace gases. The works were ultimately stopped and dismantled about 15 years ago. From the beginning of the century till the announcement of the hot-blast invention, there was practically but little progress made in the Scotch iron manufacture, and very few new works were started or projected. The author also stated that one time pig-iron made at Eglinton Ironworks was carted a distance of 30 miles, and sold in Glasgow at 35*s.* per ton. He also immediately alluded to the discovery of the Cleveland ironstone, ascribing it to Mr. John Vaughan's accidentally stumbling upon it in the course of a shooting excursion.

Mr. BESSEMER said that Mr. Mayer's was a very interesting paper, but it scarcely gave them an opportunity for discussion. He had no doubt that the general facts were correct, and as they had already got one paper behind, if they would kindly pass a vote of thanks to the author they would proceed to take up the next paper.

Mr. E. W. RICHARDS: Did you say that pit coal was first used for smelting purposes in Scotland?—Mr. MAYER: As raw coal.

Mr. RICHARDS: We have been taught that pit coal was first used in Shropshire, at Colebrooke Dale, by the grandfather of the present Mr. Abraham Darby.

Mr. MAYER: It was coal converted into coke in every instance until Mr. Dixon succeeded.

Mr. MENELAUS: I have often said that the greatest use of these papers is to take the conceit out of a man. I also believed that the Darby family were the first to use raw coal in the blast furnace, but from the evidence we have heard this morning I must give up the opinion. Being a Welshman, I naturally thought the cheapest pig-iron made in olden times was made in Wales with the blackband; but now we hear of pig iron being sold at a profit at 35*s.* after being carted 3 miles, I must disabuse my mind of the belief. Unless they fed their horses on sawdust I cannot see how it was done, for the pig-iron must have been produced at less than 1*s.* per ton, and we have never equalled that in Wales. It puts Scotland on a far higher platform than I ever thought she deserved.

Mr. NAPIER: Mr. Mayer has said that pig-iron was sold at a profit. Now, my father was a proprietor in the Eglinton Colliery, referred to by Mr. Napiers, and I know that iron was sold by them at less than cost price.

Mr. EDWARD WILLIAMS: I thought we had made pig-iron as cheap as anybody in Cleveland; but, as Mr. Menelaus puts it, I have had some of the conceit taken out of me. I never suspected that our friends in Scotland would have sold pig-iron for less than it cost them. There was one matter mentioned by Mr. Mayer that should be put in a proper light. That was the so-called stumbling of Mr. Vaughan upon this wonderful nodule of ironstone. This was a story that had gone the round of books and papers, and he had the authority of Mr. Vaughan himself for saying there was not a word of truth in it. The ironstone of Cleveland was known to exist long before the period referred to. It was sent to various places to be tried, but in every place it was declared to be of no use. To Mr. Vaughan is due the credit of having reversed the decision, and of having brought ironstone believed to be worthless into very profitable use.

Mr. MAYER wished to add that the iron in the particular case to which he had referred was sold at a profit of 6*s.* per ton. The cost of making it at Muirkirk was 25*s.*, and the carriage to Glasgow cost 9*s.* 6*d.*, which, with a profit of 6*s.* per ton, made up the 35*s.*

The next paper read was on "Napier's Differential Friction Gear for Reversing Rolling Mills" by Mr. R. D. NAPIER, of Glasgow. The mainspring of the arrangement is a friction brake, which may be so adjusted as to be practically self-holding, and yet easily slackened. Such brakes are now used extensively in the windlasses of steam and sailing vessels. One model represented a single-acting differential friction clutch, which is an arrangement for driving machinery through the instrumentality of a differential friction brake, and is used for an apparatus that has to go in one direction only, and which has to be started and stopped whilst the shafting or wheel work that transmits the power is in one continuous motion. A third model referred to a pair of reversing differential clutches, such as are applied for working planing machines, bending rolls, and other reversing apparatus of comparatively moderate size. The advantage in cost of applying the reversing gear to the pinion in place of the roll shaft is that a mill with this gear fixed can be put down at less expense than one on the common plan.

Mr. GRAHAM STEVENSON, of Airdrie, read a paper "On Reversing Rolling Machines," in which he seemed to refer to, but did not describe, a cone clutch of his invention. Every other form of clutch mentioned by the author was unfavourably criticised, but the meeting were almost unanimously opposed to his views.

Mr. KITSON, Leeds, stated that the mill at their works had been working upon the plan described by Mr. Walker in most satisfactory manner. It was worked with hydraulic power, not on Mr. Walker's plan, but on Mr. Kitson's patent. In Leeds they had a 36-in. plate-mill, making 36 revolutions per minute, and they could reverse it 24 times in a minute. With this they were quite satisfied. The friction of the clutches is accomplished by two plates brought together by hydraulic pressure. They had now got it into such thorough working order that they had now no difficulty with it. It was now working daily, and could be seen by any members of the institute who might come that way.

Mr. MENELAUS was very hopeful of Mr. Napiers's system, and was very glad to hear his friend, Sir John Alcyne, express so favourable a view of it. If he himself had to put up reversing machinery to-morrow he would, with the experience already gained, rather try the Napiers system than any he had yet seen. At the same time, he was bound to admit that Mr. Stevenson's plan was working very well indeed, and doing all that could be expected of it. There were difficulties and expenses connected with the system in operation, many of which would remove themselves as they went along.

In his paper "On a New Miners' Safety-Lamp, for Indicating by Sound the presence of explosive mixtures of gas and air, based on a new form of singing flame, and on a fog-horn on the same principle," Dr. A. K. IRVINE, of Glasgow, described some improved miners' lamps. He had had lamps made for giving light, which, while the atmosphere is not contaminated by fire-damp, or other inflammable gas, burn in the usual way, but which, as soon as such a gas mixes with air in explosive proportions enters it, appeals to the ear by a loud musical sound, as well as to the eye by its effects on the appearance of the flame in the lamp—just as in the Davy. In one form of the lamp, which is more particularly adapted for the use of the viewer or workman of a mine, the air enters near the top of the lamp, obviating the necessity of turning the lamp on its side, as is frequently necessary with the Davy, when a thin layer of fire-damp is floating at the ceiling of the mine.

Mr. R. HEATH, South Staffordshire, remarked that anything that would ensure greater safety to our mining population would be far more interesting to him than any experiment that would have a tendency to fill his own pockets. He was very glad to witness Dr. Irvine's experiments, and hoped that before leaving Glasgow he would have an interview with him on the subject, so as to get some means adopted to have the new lamp brought under the notice of practical miners.

Mr. LAUTH, of Pittsburg, U.S.A., read the next paper, which was illustrated by a drawing "On Lauth's System of Rolling Iron by Three-High Rolls." He said that in the United States nearly all mills, whether for puddled bars, rails, or plates, are three-high, and the writer is not alone in his opinion that the system of three-high rolling for any class of iron that is required is the one best adapted both for turning out quantity in a given time, and for lessening breakages to ease the strain upon all portions of the machinery, and also by lessening the labour of the men.

The means by which rails are rolled in the United States are by three-high rolling-mills. The middle roll is fixed, and the top or bottom rolls move towards or from the middle roll by means of double screws—one at the top of the standard and the other at the bottom of the standard, these screws being coupled so that the top and bottom rolls move simultaneously, and it is difficult to understand how any system of rolling by means of two-high rolls can compare with the system he had described.

With regard to plates and sheets in the United States, there are about 20 mills three-high, and the character of these mills is as follows:—The hard rolls are of the usual size, but between them there is a roll of smaller diameter—thus for a 4-ft. roll, by 20 in. diameter, the small roll would be 13 in. diameter, and for a roll 6 ft. long, by 22 in. diameter, the middle roll would be 16 in. diameter. The bottom roll only is driven from the hard rolls, both the middle and the top roll running by friction. The rolls are all turned perfectly straight and level, so that they bear all over, and a stream of water is constantly kept upon each roll to keep it perfectly cool. The effect of this is that there is no expansion and contraction of the rolls, and the sheet or plate is rolled to a perfect level, free from all buckling. The surface of the sheet or plate is very smooth, the water having the effect of washing off all the scale, and preventing it from sticking to the rolls. Some people are under the impression that by using so much water the sheets and plates would get cold. Such, however, is not the case, as the water runs off in globular form, and in practice it is no impediment. By the old system of rolling, the plates and sheets are usually thicker in the middle than at the edges. By this system they are rolled all over to a uniform gauge in consequence of the rolls being kept cold. The reducing power of the middle roll is very marked, and this is accounted for by reason of the smaller area which is covered in the grip of the plate, in consequence of the diameter of the roll being smaller. The effect is that a larger draft can be put upon the plate or sheet than by the old system, with the same power involved in the machinery.

Mr. MENELAUS remarked that however it might suit in America, it would not do in England to use the three-high rolls. It would entail the necessity of keeping an immense stock of rolls. That was an item of expense that would be necessary to suit the tastes and opinions of the various engineers. They had three sections of rail in England, the double-headed, the flange, and the bridge rails. Every engineer, in fact, had his own form of rail, so that there was an unlimited number of sections made in England for English engineers; but when they added to this the foreign trade, the number of rolls became something enormous. They had about an acre of them at Dowlais, and he should not like to have an acre and a half. (Laughter.) That was, perhaps, the principal reason why they had not adopted the three-high system of rolling rails. When they ran into small quantities they had often to change the rolls five or six times in a week.

Mr. EDWARD WILLIAMS: I have been making rails for about 30 years, and during that time we had difficulties innumerable and of all sorts, excepting that I never knew a difficulty as regards the section of American rails. That says very much for the good sense of the American engineers. The difficulties that arise with a young engineer coming from one of the technical schools in Germany or France, or with an energetic young gentleman just come from an engineer's office in Great George-street, who requires strict mathematical accuracy, those of us who have been worried in rail making know very well. With the best kind of two-high mill we can design it impossible to please people that require great exactitude, and with the three-high mill the thing would be utterly impossible. I don't think any three-high mill could work with the bottom roll fixed and the other two movable. To do that, and keep the rails at a section involves an absolute impossibility. The great reason why the English rail makers stick to the two-high mill for ordinary rail making is that it is found to be the most economical. Mr. Bessemer has taught us to make a metal that will make rails of any length. I don't see why Bessemer rails should not be rolled 100 ft. in length, and afterwards cut up into lengths as required. When we come to make Bessemer metal as cheaply as iron, and that day will come, the two-high system of rail rolling will disappear, because of the enormous length to draw back. I am inclined to think that when that time comes we shall have a four-roll mill, two going in one direction, and two in the other, the one so placed as regards the other that the rolling backwards in one direction will be the exact equivalent of rolling forward in the other. As regards sheets

and plates the system now spoken of ought to succeed for many reasons. I have seen it at work at Newport, and it seemed to me to do very well. I do not quite see the rationale of rolling the surface of the sheet in opposite directions. There is on the surface of the rail a kind of nap, which, if you brushed it backwards and forwards, was like brushing the hat both ways at once. If you want a smooth surface you will have to roll in the same direction. I do not understand why water should not act on two-high rolls as well as three. From what I have seen, however, I think the three-high rolls work uncommonly well, and I expect they will achieve a great economy as well as a larger output of iron.

Mr. LOUTH said that Mr. Williams wished to know why they could not use water on two-high rolls as well as three. The reason was that in the three-high rolls the plate was finished so much quicker that it did not get time to cool. By the use of three-high rolls Mr. Jones, of the Ayrton Rolling Mills, has made in ten minutes 1 ton of 16 gauge iron, and this showed what they were capable of.

The PRESIDENT: Mr. Menelaus has referred to the continuous changes in the rails used in this country, and I would remark that one would think our engineers had by this time arrived at the conclusion that one given section of rail would answer the purpose of one line just as well as another. They are just entailing extra cost by these minute distinctions in size. It can be no advantage whatever to the companies they represent to have so many changes of section, but, on the contrary, there is an immense increase in the cost of production, and a great annoyance to all the manufacturers. On a former occasion, when speaking to a meeting of the Iron and Steel Institute, I had the pleasure of expressing a wish that a uniform system of rails might be universally introduced in this country, and I hope that the remarks made by Mr. Menelaus will have that effect, for they evidently show that we are still labouring under the difficulty that might be so easily removed.

[To be continued in next week's *Mining Journal*.]

MINERS' ASSOCIATION OF CORNWALL AND DEVON.

The classes of this association assembled for their annual excursion on Wednesday, Aug. 7, when the Phoenix and West Phoenix Mines, near Liskeard, were visited by a party of 70. The weather was particularly favourable, for, although heavy storms visited many parts of Cornwall, none of the party were inconvenienced by rain during the whole day. The classes from St. Just, Pendeen, Breage, Helston, Hayle, Camborne, Redruth, St. Day, and St. Austell proceeded to Liskeard by the first up-train, and from thence proceeded by vehicles of many kinds and conditions to the mines—distant about seven miles to the northwards, through some of the finest hill-scenery in Cornwall. On their arrival the party, under the guidance of the Rev. Salter Rogers, M.A., vice-president, and Mr. J. H. Collins, F.G.S., lecturer and assistant secretary of the association, were received by Mr. Wm. West, C.E., and conducted to the account-house, where the plans and sections of the mines were displayed and patiently explained. Mr. West then conducted his

of English houses, rather long periods being allowed for delivery. It would appear from this that speculation is not foreign to this unusual demand. Coke has attained feverish prices. The nominal rate is 25s. 10d. per ton, but almost all the contracts concluded are entered into upon higher terms. It is announced from Liège that three metallurgical companies of the East of France and the Grand Duchy of Luxembourg have acquired land in the Seraing basin, with a view to the construction of coke furnaces.

The condition of the French iron trade remains much the same; prices are supported with much firmness, and more contracts are proposed than can be accepted. For charcoal-made refining pig as much at 7s. per ton has been paid in the Haute-Marne. The intelligence received from the Nord is good; the strikes which have occurred may be regarded as terminated, and work has been nearly everywhere resumed. At Paris the state of affairs reflects the condition of the great producing markets, but there is much less activity. The warehouses are disposing of their stocks with facility. The promulgation of the new law upon raw material is anxiously awaited, not because it is desired, but because embarrassments are apprehended as likely to ensue from its application.

The animation in the Belgian iron trade is increasing instead of diminishing, and there are continued rumours of a further rise in plates, merchants' iron, sheets, &c. Several contracts have been concluded at prices above the quoted rates, but, at the same time, the new quotations have not become general. One or two affairs have been concluded in No. 2 plates at 15s. 4d. and 16s. per ton, and there have been some transactions in No. 1 merchant iron at 11s. 4d. per ton; but these are exceptions which have had no other influence than to confirm the already general tendency to an advance. Excessively hot weather has rather sensibly decreased the production, and especially that of the rolling-mills. On the other hand there are reports almost every day of the erection and re-lighting of blast-furnaces. Among others that of M. Cambier, of La Louvière, has been re-lighted. The formation may also be noted of the Luxembourg Forges and Rolling Mills Company. The works will occupy about five acres. The Council of Administration of the new company is composed of M. Alexis Brasseur, advocate and deputy for the Grand Duchy; Gustave Defacqz, industrial, of Liège; Eugène Muller, mechanist, of Luxembourg (formerly engineer of the Château-l'Évêque Company); Arthur Brun, managing engineer of the Monceau Works; and Auguste Brasseur, broker, of Brussels, formerly engineer of the Couillet Company. The most remarkable current feature in the Belgian iron trade is the influx of English orders, which come to hand not only for coal but also for iron. M. Victor Tahon, who was sent to Mid-dlesbrough by the Association of Belgian Forgemasters, to report upon the Danks furnace, pronounces it a great success. The precise expression is a "real success."

OPENING OF THE NEW ZEALAND COMPANY'S BATTERY AT COROMANDEL.

I have already forwarded to you a short account of the opening of the New Zealand Company's battery, an event which has been looked forward to with more interest than any similar ceremony which has taken place in Coronadell. The interest attached to this opening is entirely due to the Green Harp claim, and the anticipations which have been formed as to its extraordinary wealth, for the battery was erected mainly to crush for this claim; and had it not been for the riches developed by the shareholders it would have been a long time yet before a battery would have been erected on this portion of the beach. Greater interest was felt in the opening still, because it was foreseen that the battery would set at rest all speculation as to whether the Green Harp were the rich claim it had been represented to be, or whether, as has been ascertained by some, and believed by many, it has been unduly puffed, and will prove a duffer. There is no doubt Mr. Sheehan hit the right mark yesterday, when he said that the whole of the old shareholders held all their original shares, and this was the best proof of their opinions of the claim.

At the ceremony of the opening Messrs. John Williamson, M.L.A., John Sheehan, M.L.A., D. Cruickshank, C. Ring, G. Bennett, G. W. Brookes, F. Ring, and a large number of other gentlemen from Auckland, interested in mining pursuits, were present, while Coronadell turned out nearly all its residents on the occasion. Soon after 3 o'clock, steam being up, the battery was started, and Miss Sheehan and a number of ladies having taken places in the engine room, the former, as the engine moved, broke a bottle of champagne on the fly-wheel and christened it the "Elizabeth," amid a continuous round of cheers from all present. The machinery was kept going half an hour, and the manner in which it worked was the theme of admiration with every one present.

I have often noticed the battery as it was being erected, but the following description has been furnished by Mr. Thomas, and will be read with interest: "The engine is one of Tangye and Brothers, engineers, London. Diameter of cylinder, 14 in.; capable of being worked to 30-horse power, with the boiler attached, and to drive, when necessary, 30 stampers, 15 of which are only at present at work. The engine is so placed as to do its work in the centre of each 15 stampers. The boiler is Howard's patent tubular, the same kind as have been in use at the company's Kapanga Creek battery during the past two years, and which have proved very economical respecting the consumption of fuel, as well as a most effective one for raising a very high pressure of steam. The boiler consists of a series of wrought-iron welded tubes, 8 in. in diameter, standing vertically in enclosed brickwork; the whole of the tubes numbering twenty-four, being all connected by steam joints into one space, the fire going through and between the tubes, causing a very large area of heating surface. The battery is supplied with a double-acting steam-pump, for supplying the tables with sea water if (in dry seasons) the fresh water supplies should be limited, affording the amalgamating process the advantage of salt or fresh water if desired. The tables are of the most improved construction, and are covered with plain copper and electro-silver copper plates; the length of fleet from stamper boxes about 30 ft., adjusting screws being fixed to raise or depress the copper tables to any angle required. The battery is supplied with two Beldans for the present, with ample accommodation for saving the tailings, when found payable to save. The whole battery arrangement is fixed in a small space, and the works carried out by the manager's plans with very great credit to Mr. Vernon for the most substantial manner he has erected the machine, and fixed the internal details, &c. The present plant will crush 150 to 170 tons per week, which is sufficient in quantity to test that portion of the field for the coming winter, and additional stampers will be erected where wanted."

As soon as the battery stopped the company went their way to the Emerald Isle Hotel, where a substantial repast had been laid out. The chaise was occupied by Mr. Cadman, supported on his right by Mr. J. Williamson and Mr. Thomas, and on his left by Mr. Sheehan, the Rev. Mr. O'Reilly, and Mr. Whitaker. The vice-chair was occupied by Major Keddel. After ample justice had been done to the viands with which the tables were loaded the CHAIRMAN called for full glasses, which was duly responded to. He said the first toast he had to propose to them was "Success to the New Zealand Company." He regretted that the day was so far gone, and so many had to return to Auckland, as it would be necessary to shorten the proceedings. He was sure that all must have been pleased with the entire success of the opening. There were 15 head of stampers, weighing over 7 cwt. each, and they had all worked smoothly and with a total absence of all vibration. The way in which they had economised space was very creditable, and no one could doubt but that the battery was one of the best in the field. They were under great obligations to Mr. Thomas for the way he had worked these things up. He did not stop here, but was going to erect more machinery on the old Kapanga claim, and develop that end of the district. —The toast was drunk with three times three.

Mr. THOMAS thanked them most heartily for the compliment they had paid him, and the confidence they had shown in him to-day. He thought they were under great obligation to Miss Sheehan for coming so far to christen the engine for them. (Cheers.) —The CHAIRMAN said he regretted he could not find time to detail on the toast "Success to the Green Harp Claim." He then gave a history of the finding and discovery of the claim, and the hardships endured by the shareholders while developing the riches they believed it to contain. They had toiled and worked hard, and when they got the gold, there was plenty to say it was only a sham and a swindle. A few days would prove whether it was a swindle. And for his part he would say he had got a lot of gold each. —The toast was drunk with great cheering. —Mr. HOWE said that he was hardly able to thank them for the compliment they had paid him. He would not refer to the difficulties they had to surmount; but this he would say, that it was not the capital of Coronadell which prospected the Green Harp claim. The people here were poor, like themselves, and when they wanted money they sent to the South, and he need not say they got all they wanted. (Cheers.)

The CHAIRMAN next proposed "The Mining Interests of Coronadell;" and he said that it had not been for the gold from Coronadell and the Thames grass would have been growing in the streets of Auckland. (Cheers.) He should refer to the fact that all that could be offered to the starving unemployed of Auckland before the gold fields opened was breaking stones. —The toast was drunk with three honours. —Mr. J. SHEEHAN responded to the toast, and said he had not intended to make a long speech, but he must say that nothing could be more important than the mining interests of the district. He hardly thought that grass would have grown in the streets of Auckland, but he must say that it was to the Thames and Coronadell that Auckland was indebted for her present prosperity. He remembered walking one day on the wharf in Auckland, and wondering whence deliverance was to come from the depression under which every interest was then suffering. That question was answered by the Thames and by the recent discoveries in Coronadell. It must not be forgotten that Coronadell was the place where gold was first discovered in New Zealand, although at the first it had not been a success. On one occasion when he was speaking to Mr. Keven, whom he looked upon as the father of the gold fields in this colony, he was much struck by a remark he made. He said, "I don't mean that that small spot called Keven's Point is the only gold field, but Keven's Point will extend from Cape Colville to Te Aroha." Mr. Keven's words were likely to be fulfilled. With regard to what had been said about the Green Harp being a sham and a swindle, he would only say that the best proof of what the proprietors thought of it was the fact that an inspection of the books of the company would show that the old shareholders still held all their original scrip.

The CHAIRMAN next gave "The Hon. John Williamson," paying a deserved compliment to the great interest he had always taken in the development of the gold field. The toast was drunk with three times three. —Mr. WILLIAMSON returned thanks, and alluded to the first discovery of gold at Coronadell, the great depression that existed in Auckland, and the offer of a reward of \$5000, for the discovery of a gold field, and the fact that it remained a dead letter until he was elected superintendent, and the part he took in opening the Thames gold field.

He then alluded to the numerous alterations in the mining laws, and expressed a hope that Mr. O'Neill, who is now in Victoria, would be of great assistance in carrying out the contemplated alterations. —Mr. COSGRAVE proposed the health of Mr. Warden Keddel, which was duly honoured, and Major Keddel expressed his warmest thanks. "The Ladies" was next given from the chair, and thanks returned by Mr. WHITAKER in a very humorous speech. "The Press" and "The Health of the Chairman" wound up the proceedings, which terminated in a very pleasant way. —*New Zealand Herald*, June 7.

FOREIGN MINES.

DON PEDRO NORTH DEL REY. — Telegram from Lisbon: Produce for June, 58,900 oits.; produce to July 18, 1426 oits.

PORT PHILLIP AND COLONIAL. — Telegram, dated Galle, Aug. 9, in anticipation of the mail leaving Melbourne, July 17, and due here Sept. 2: Month ending June 18, yield per ton 4 dwt., from quartz only. Fortnight ending July 2, yield per ton 4 dwt., 12 grs., from quartz only. Western low level looking very well.

SWEETLAND CREEK. — Telegram from the superintendent: We have cleaned up after a run of 57 days. The gross returns are \$23,250. The profit is \$10,000. I send you a remittance of \$5000. Tunnel cost, \$2700.

BIRDSEYE CREEK. — Telegram from the superintendent: We have cleaned up Uncle Sam Claim after a run of 32 days. Profit, \$1500.

EMMA. — Telegram from Salt Lake City: Forwarded 130 tons first-class ore this week to New York; raised 160 tons first-class ore this week; raised second-class ore, nothing; 150 tons first-class ore at railway depot; 420 tons first-class ore raised at mine; water in mine all gone except in deepest shaft; mine improving; yield increasing daily.

HUDSON. — Telegram from Messrs. D. M. Nosmer and Hopkins, who were appointed to examine the title of the Hudson Gold Mine: The title to the Hudson Gold Mining property we found perfect in the vendor and unencumbered, and the deed transferring the property has been placed in the books of the County Recorder.

GOLD RUN. — Telegram from Mr. O. S. Kipp, manager of the mine: We have cleaned up after a run of 24 days, realising \$5300. The company are also advised of the purchase of the neighbouring claim, Sherman, for which they have been negotiating some time.

MONTAGUE AND WAVERLEY. — Since the signing of the contract for the transfer of the mines the directors have received an offer for the tailings at a price sufficient to pay a dividend of 30 per cent. on the capital of the company.

JAVALI. — The directors have advices from Captain Sohne that the mill has crushed 900 tons, yielding 310 ozs. of gold, being 7 dwt. per ton. The expenditure has been \$2806, and the gold has yielded \$3875—showing a profit of \$1069. Health good, and labour sufficient.

CHONTALES. — Mr. Belt, July 5: Gold returned for the month of June, 250 oits., from 1035 tons of ore. Average yield, 4½ dwt. per ton; value, \$654; cost for the month, \$96, which includes the sum of \$92, for erection of new stamps and arrastré. Mr. Belt reports that great progress has been made with the erection of new stamps, and expects to get them finished by the end of the month.

John Tonkin, Daniel Tonkin, July 4.—**San Antonio Mine:** A stoppage in the back of No. 6 level has been stopped 12 varas; the lode is 3 ft. wide, worth 5 dwt. of gold per ton. —**East San Benito Mine:** A stoppage in back of No. 2 level has been stopped 15 varas; the lode is 3½ ft. wide, worth 3 dwt. of gold per ton. A stoppage in the back of No. 1 level has been stopped 4½ varas; the lode is 4½ ft. wide, worth 5 dwt. of gold per ton. The No. 2 level has been driven east on the lode 15 varas; the lode is about 4 ft. wide, and poor. For the last two months we have been driving a new side level from No. 2 cross-cut east, a distance of 32 varas, which we intend for a main level, as on the course of the lode can with difficulty be kept open, owing to the extensive workings in the back of the same. —**Santo Domingo Mine:** The level east, on the course of the lode, has been driven 24 varas; the lode is 4 ft. wide, now worth 4 dwt. of gold per ton. We have risen and sunk in the back and bottom of this level for a pass to convey the quartz to the tramway leading to the stamps, which will also ventilate the mine, as at present, owing to very heavy rains, we suffer great inconvenience from foul air. The quantity of quartz sent to the port is as follows: —From San Antonio Mine, 102 tons, yielding 4½ dwt. of gold per ton; from East San Benito Mine, 103 tons, yielding 4½ dwt. of gold per ton; in all, 1105 tons, yielding 250-6 ozs. of melted gold.

BATTLE MOUNTAIN. — Captain Richards, July 25: Virgin: In the 133 being driven north the lode is improved in appearance, and produces some very fine stones of copper ore. In the 73 drift north the ground is good for working, but shows no ore at present. Jack's stope is still producing very fine ore, although not quite so high a percentage. Owing to the demand for good miners in other sections of this country at a higher pay, our force has been reduced to 18 men; but I am expecting some men here in the course of the week. 719 sacks raised during the past fortnight.

SIERRA BUTTES. — Result of the clean-up for the month of July: Receipts, \$39,005; 3769 tons of ore were crushed during the month; cost of mining and milling same, at 84-23 per ton, \$15,669-50.

SAN PEDRO. — Richard Kitto, June 15: New Shaft: In the 135 we are cutting a cistern plat to contain the water; as soon as this is finished we begin to sink the shaft. The 135, driving on the edge of the lode, or manto, is producing good stones of ore. The cliffon sinking from the 128 is communicated with the 135; this has opened out a good piece of ground, which we shall stop away as soon as the ground is sufficiently drained. No. 1 stope in the back of the 128 will produce 2½ tons of 35 per cent. ore per fathom. No. 2 stope, back of same level, will produce 2 tons of 40 per cent. ore per fathom. No. 3 stope, back of same level, on the 30 fm. level, by four men, at one-half tribute, will produce 3 tons of 24 per cent. ore per fathom. A cliffon sinking from surface on a new level or manto, which is producing good stones of ore—**Santa Elena Mine:** We are sinking a cliffon here for a roadway, we hope to communicate in a few days. —**San Antonio:** The stope is about 10 metres of water here; I must dial this cliffon and sink a shaft from surface. —**Cuba:** There is no alteration here since my last. We are very short of men at all the mines. I have sent to Chanaral, and will also send to Copiapo, to try and get people. I am glad to say things are going out quite well in the mines, and believe we have got a splendid property.

—**R. M. Kitto, July 1: New Shaft:** In the 135 fm. level we have completed cutting cistern plat for water; the men are now engaged in cutting ground for timbers for the penthouse. The 135, driving on the edge of manto in a north-westerly direction, is producing good stones of yellow ore; the ground is very favourable for copper. The 135, driving south, is producing 1 ton of 40 per cent. ore per fathom; this level is being driven in the direction of a good course of ore met with in the level above, where it produced 14 tons of 50 per cent. ore per fathom, but was cut out by a slide of poor ground; there is every indication of cutting something good in this end—some stones will give above 60 per cent. We have suspended all stopeing in the back of the 128, and shall from this time begin on the new system of buck stopeing from the back of the bottom level by filling up the workings with poor stuff, which will obviate the costly mode of timbering. We have been engaged in the past 15 days in sending down stuff from the 88 fm. level, and are now making the change of working that I anticipated would be necessary before leaving England. I find it very difficult to get the workmen to understand the mode of filling up instead of timbering; it will take some months to fill up properly, and put things in good working order. There is a considerable change in the stratum, and in the class of ore at the 135 fm. level. North part of manto from grey and native copper to yellow sulphurites; this is a very satisfactory indication. I think, the next lift or sink in the shaft will come on a solid manto of yellow bronzes. We have set the ground south of new shaft, back of the 122 fm. level, one-half tribute for two months. I find by examining the western branches they are not cut below the 75, there one shall put out a cross-cut at the 88 to cut them. We require 10 or 15 English miners to work on tribute, as I find there is plenty of ground standing in various parts of the mine. A pitch in the bottom of the 30, by four men, at one-half tribute, will produce 3 tons of 20 per cent. ore per fathom; the quality of the ore has fallen off a little. The tribute pitch in the back of the 128, by three men, half tribute, will produce 2½ tons of 18 per cent. ore per fathom. A cliffon sinking from surface on the new lode, is producing good stones of ore—**Santa Elena:** I have dialled this and find the cliffon is 9 ft. 6 in. off from shaft; the ground at this point is rather hard. We expect to communicate in a short time. —**San Antonio:** I have dialled this and commenced to sink a shaft from surface. We cannot do anything in the bottom of this mine for water. A gully of one yard last March month, and cut water at the same time; we shall have to sink this shaft 150 feet to get as deep as the working. —**Cuba Mine:** We are short of workmen, for this there is no alteration here since my last.

BRAGANZA. — July 16: Our operations have been for the last month on a more limited scale, in consequence of the native labourers leaving for the railway works just commenced. In the deep adit we are making explorations in every direction. We are now driving a cross-cut on No. 1 lode to intersect No. 2 lode, in which we worked in B level above: we think it prudent to give it a further trial at a lower horizon. In No. 3 lode we encountered a floor of "caco," hard clay slate and iron, full of water. We have just got through it, and again met with the lode 3 ft. wide; we cannot yet say anything as to its quality, from not having time to stamp any of the stone. —**Jacutinga Formation:** We have done but little here since my last, and have no change to report.

MALAGA (Lead). — Mr. Tait Brindley reports: —"Everything goes on perfectly satisfactorily and straightforward at the mine. The appearance and quality of the lode in the south ground improves every fathom we drive on it, and I am opening out the work with the utmost dispatch. We have a leader in the lode in the south ground now 1 ft. thick, and are increasing the get of lead weekly."

Capt. Cocks writes: —"In the north ground of these mines there is no change to notice since my last report. We are pushing on two cross-cuts as fast as we possibly can. The centre cross-cut is in beautiful ground, and very easy for exploring; the ground is mixed up with pebbles, peat, and mud; indeed, it is mineralised strata. Any lode cannot fail to make large deposits of mineral when intersected in ground of this character. We hope soon to intersect a lode at this point.

This cross-cut is now being driven on contract, at \$3 per metre. We have suspended all stopeing and driving on the course of the lodes at this point for the present, and placed the men on the south ground, where they can work to much greater purpose and benefit for the company. The deep adit cross-cut is being pushed on with all possible dispatch by six men day and night, so as to reach the lodes as early as possible. We anticipate meeting with large deposits of lead ore. The ground in this cross-cut has been very much against the miners for some time past, being very hard. We have let this level on contract at \$18 per metre, and I am pleased to inform you this last two days the men are making better progress. There is a tide of water issuing out of the end, which is a proof we are nearing the lode, and I hope soon to be able to report to you of our intersecting it. Every attention is paid to the two above cross-cuts, the men well supplied with materials and eagerly pressed on, as it is the opinion of all practical men, as depth is obtained and the lodes intersected, the results will be highly satisfactory. In the south ground we are making good progress on the course of the lode in the shallow workings, and getting out good quantities of lead ore of a rich quality. I saw one hole fired yesterday that took out one wheel-barrowful of lead ore, and the lode is larger and better defined in the bottom of the lode than in the back, so that is satisfactory to us that as depth is obtained we shall have a rich part of the mines in the south ground. We are daily getting lead ore from this part of the mines, and have large piles on the floors, dressed and to be dressed. All experienced men that see this part of the mines pronounce it to be a very valuable property. We have an east and west lode, or what is termed to be a cross-course, on the course of which we are driving an adit level, which will intersect the main lode from 18 to 20 fathoms deeper than present workings; and in driving this adit level we have already discovered some

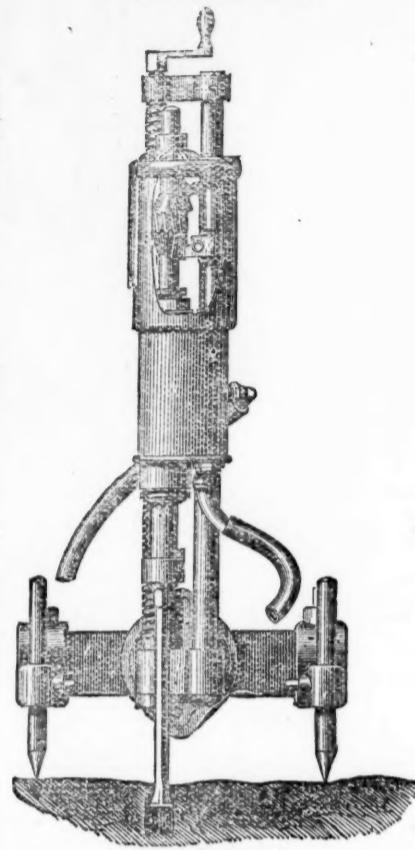
fine deposits of lead ore, and undoubtedly when we reach the main lode with this adit level we shall discover a large deposit of ore. The adit level we have had driven since July 1 over 26 yards, and is now being driven at \$3 per metre. We have also commenced to sink a shaft, which will come down on the back of the lode, so as to ventilate the mine well, and give every facility for working the mine on an extensive scale, as the underground operations are being conducted on the most approved principle, and with economy."

CAPE COPPER. — The directors have despatches, per European Railway: Traffic for fortnight ending June 15, 82 tons up and 305 down. A small adit had been put to work on the railway construction. Bills of lading are received for 340 tons of ore per Lywood; 620 tons of ore, part cargo ex Mary Tatham, and 19 tons of regulus, ex steamer, were sold by public ticket on the 23rd ult., at an average of 19s. 3d. per unit, realising approximately 17,900, and 500, respectively.

LUSITANIAN. — Thomas Chegwin, Aug. 6: **Palha:** The lode at Taylor's engine-shaft, below the 150, the lode has not been taken down, but where seen is composed of quartz and stones of ore. The plat in the 120, at River shaft, is completed.—**Levels on Basto's Lode:** The 150 is going east of Taylor's on a lode 5 ft. wide, unproductive, and west on a lode 8 ft. wide, with a branch of ore worth 2 tons per fathom. In the 140 and 130 fm. levels, going east, the lode is from 5 to 8 ft. wide, composed of quartz and flookan,

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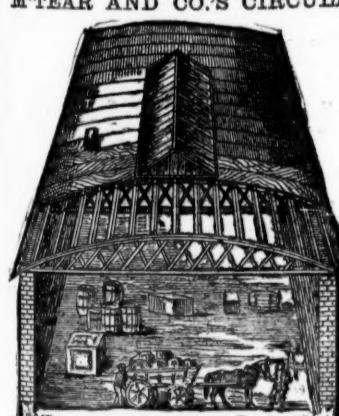
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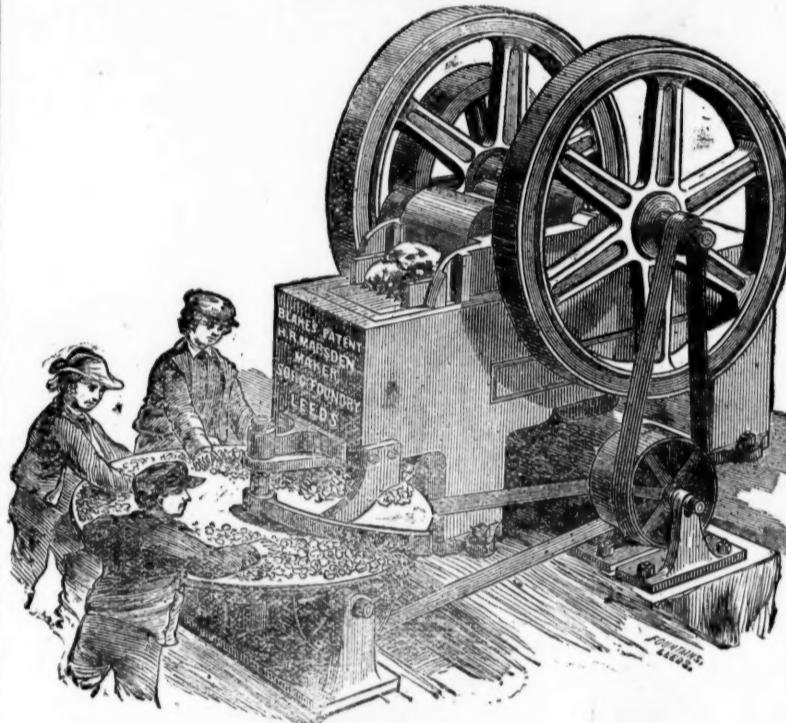
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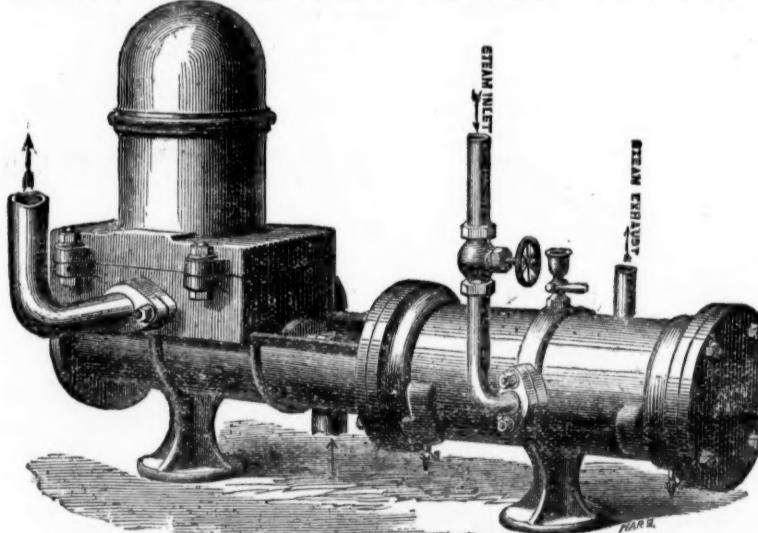
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Tottenham Local Board of Health, Tottenham, 12th December, 1870.

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I am, Gentleman, faithfully yours, (Signed) F. P. MARSHALL, C.E., Surveyor.

Aston Main Coal Company, near Sheffield, 1st December, 1871.

GENTLEMEN.—In answer to your enquiry, I beg to state that the two "Universal" Pumps supplied to us (through your agent, Mr. T. A. Ashton) are doing our work exceedingly well; we think they are the best in the market, and shall be glad if you will send us another 9-in. cylinder 6-in. pump, one week from this date.

Yours truly, (Signed) ASTON MAIN COAL COMPANY.

Extract of a Letter from JOHN SIMPSON, Esq., to Hayward Tyler and Co.'s Agent.

Rhos Llanwedd Colliery, Cwrtphilly, near Cardiff, March 4, 1872.

I should like to have the water-piston and clacks the same as in our present pump, as they work exceedingly well, and I do not think it is possible to improve upon the present pump, except by lining the cylinder with brass as ordered. (Signed) JOHN SIMPSON.

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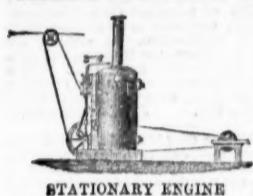
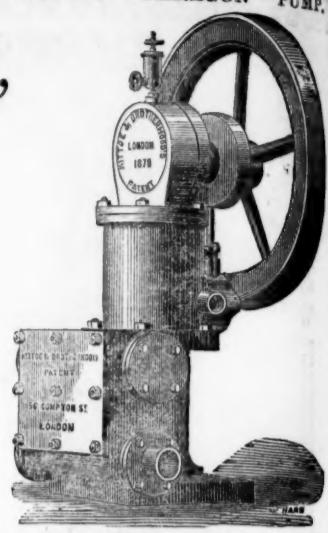
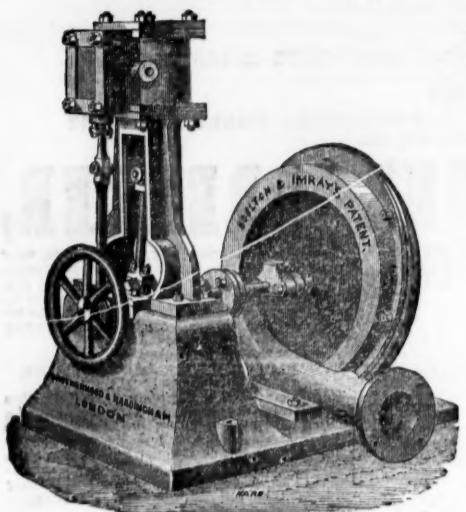
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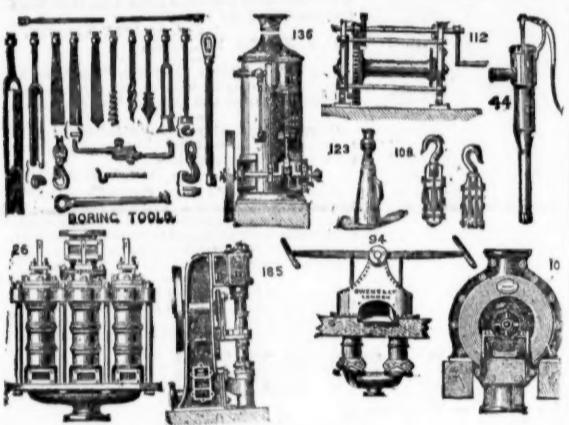
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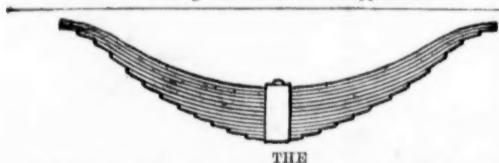


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No. 108.—Pulley Blocks of all sizes.
No. 123.—Bottle and other Lifting Jacks.
No. 94.—Double-barrel Pumps, for Mine or Quarry use.
No. 44.—Portable Wrought-iron Pumps, ditto ditto
No. 102.—Bernay's Patent Centrifugal Pumps, of all sizes.

ALSO EVERY OTHER DESCRIPTION OF
HYDRAULIC AND GENERAL MACHINERY,

COMPRISES

TURBINES, WATER WHEELS, WIND ENGINES,
THE HYDRAULIC RAM, FIRE ENGINES, &c.
Catalogues and Estimates on application.



THE RAILWAY SPRING COMPANY,
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Having purchased from the Trustees of the late Firm of W. Charles and Co. the extensive works, with the valuable and improved machinery, are prepared to execute orders for every description of

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MANUFACTURERS OF EVERY DESCRIPTION OF
IMPROVED

PATENT FLAT AND ROUND WIRE ROPES
from the very best quality of charcoal iron and steel wire.

PATENT FLAT AND ROUND HEMP ROPES,
SHIPS' RIGGING, SIGNAL AND FENCING STRAND, LIGHTNING CONDUCTORS, STEAM PLOUGH ROPES (made from Webster and Horsfall's patent steel wire), HEMP, FLAX, ENGINE YARN, COTTON WASTE, TARPAULING, OIL SHEETS, BRATTICE CLOTHS, &c.

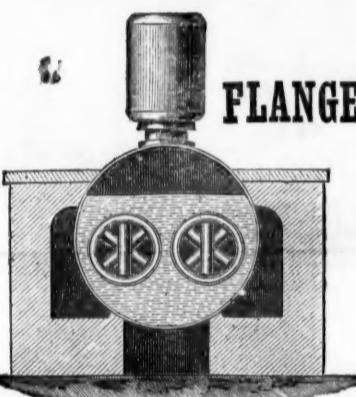
UNIVERSE WORKS, MILLWALL, POPLAR, LONDON.
UNIVERSE WORKS, GARRISON STREET, BIRMINGHAM.
CITY OFFICE, No. 5, LEADENHALL STREET, LONDON, E.C.

HAWKSLEY, WILD, AND CO.'S PATENT

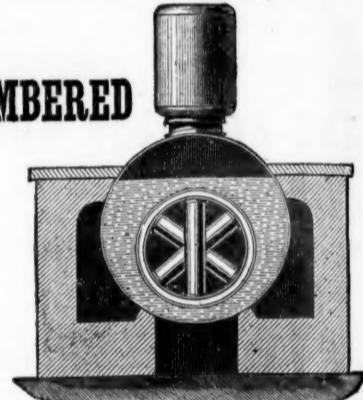
FLANGED & COMBUSTION-CHAMBERED

FLUED

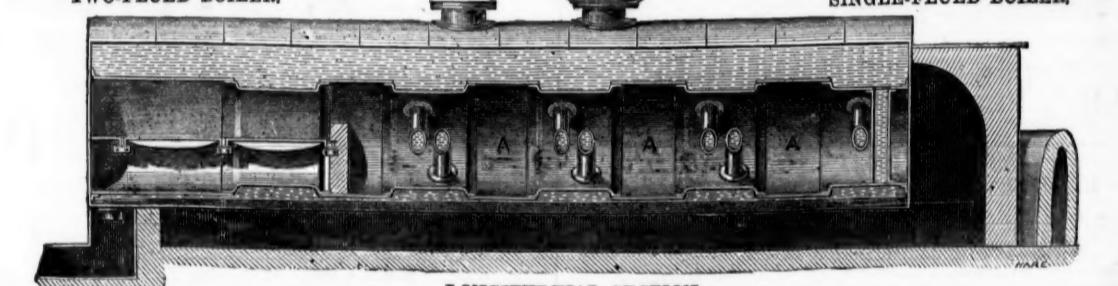
BOILERS.



TWO-FLUED BOILER.



SINGLE-FLUED BOILER.



LONGITUDINAL SECTION.

THE FLUES OF THE ABOVE BOILERS ARE MADE OF TWO DIAMETERS, ONE RING OF PLATES BEING

4 inches less than the other, alternately.

The smaller rings being flanged, as shown in drawing, are thereby considerably strengthened, besides securing the most material point—a perfect EXPANSION-JOINT.

The cross tubes are placed in the smaller rings of the flue, so that any one can easily be taken out and replaced.

The larger rings of the flue act as reverberating, combustion, and heat-retaining chambers, greatly economising the fuel.

These Boilers are strong, durable, and economical, and have been at work a number of years with the most satisfactory results.

PATENTEE AND MANUFACTURER:

HAWKSLEY, WILD, and CO., Engineers and Boiler Makers,
SAVILLE STREET EAST, SHEFFIELD.

PATENT STEAM EARTH-BORING MACHINES FOR MINERAL EXPLORATIONS AND WATER SUPPLY,

Capable of BORING HOLES from 6 to 36 in. diameter, and to any depth to 2000 ft.

Price, and terms of hiring, may be obtained from the Patentees.—

MATHER AND PLATT,
SALFORD IRONWORKS, MANCHESTER,
MAKERS OF
LARGE PUMPS, PUMPING ENGINES, WINDING ENGINES, &c.